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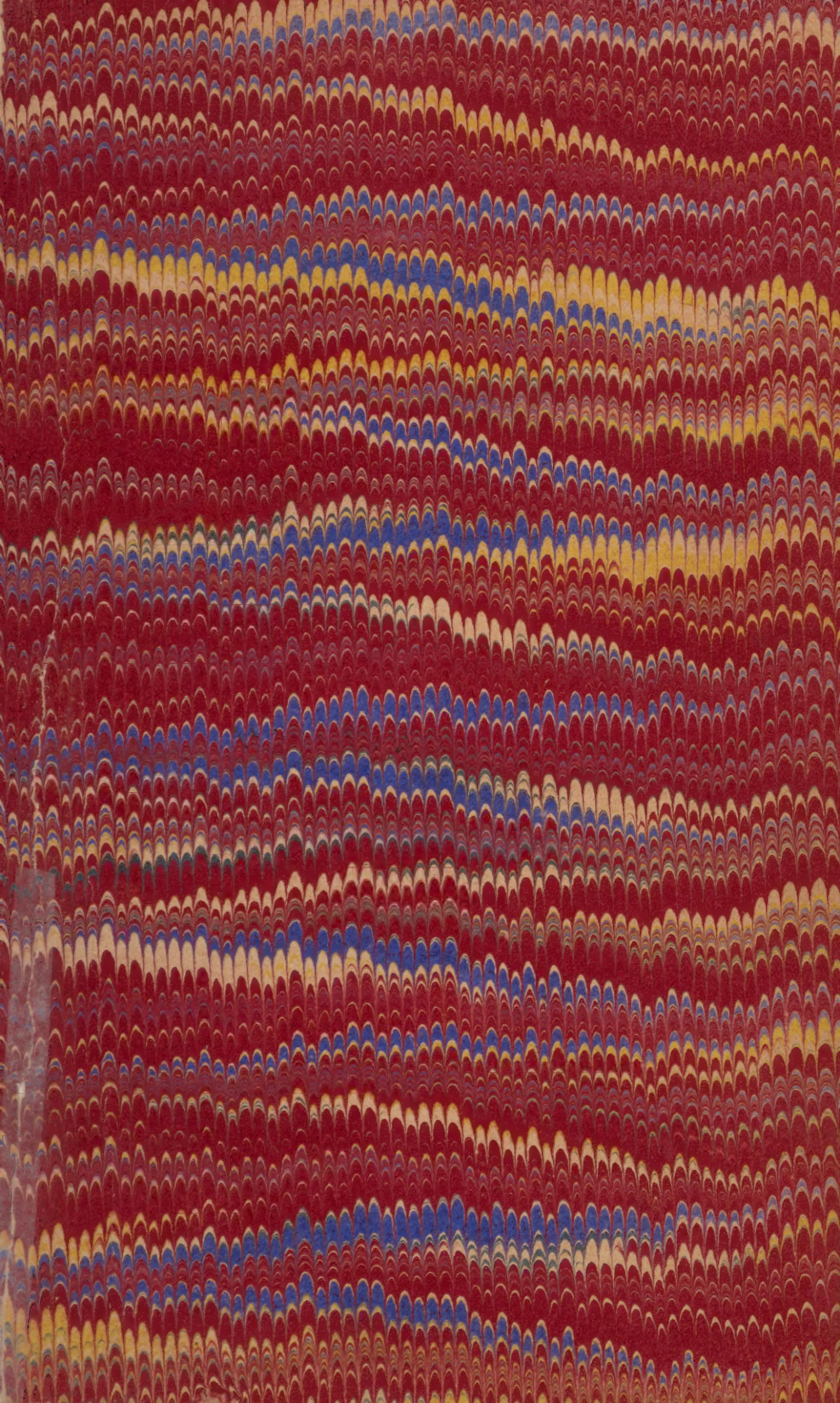
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THE ORIGIN OF THE NATIONAL
SCIENTIFIC AND EDUCATIONAL
INSTITUTIONS OF THE UNITED
STATES

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BY

DR. G. BROWN GOODE

ASSISTANT SECRETARY OF THE SMITHSONIAN INSTITUTION, IN CHARGE OF
THE U. S. NATIONAL MUSEUM

[REPRINTED FROM THE PAPERS OF THE AMERICAN HISTORICAL ASSOCIATION]

NEW YORK AND LONDON
G. P. PUTNAM'S SONS

The Knickerbocker Press

1890

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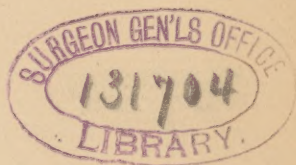
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THE ORIGIN OF THE NATIONAL SCIENTIFIC
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THE UNITED STATES.

THE ORIGIN OF THE NATIONAL SCIENTIFIC AND EDUCATIONAL INSTITUTIONS OF THE UNITED STATES.

By G. BROWN GOODE, Ph.D., LL.D., Assistant Secretary of the Smithsonian Institution, in charge of the U. S. National Museum.

"Early in the seventeenth century," we are told, "the great Mr. Boyle, Bishop Wilkins, and several other learned men, proposed to leave England and establish a society for promoting knowledge in the new Colony [of Connecticut], of which Mr. Winthrop,¹ their intimate friend and associate, was appointed Governor."

"Such men," wrote the historian, "were too valuable to lose from Great Britain, and Charles the Second having taken them under his protection in 1661, the society was there established, and received the title of 'The Royal Society of London.'"²

For more than a hundred years this society was for our country what it still is for the British colonies throughout the world—a central and national scientific organization. All Americans eminent in science were on its list of Fellows, among them Cotton Mather, the three Winthrops, and Paul Dudley in New England; Franklin, Rittenhouse, and Morgan in Pennsylvania; Banister, Clayton, Mitchell, and Byrd in Virginia, and Garden and Williamson in the Carolinas, while in its "Philosophical Transactions" were published the only records of American research.³

¹ John Winthrop, F.R.S. [1606-76], elected Governor of Connecticut in 1657.

² Elliott, "Biographical Dictionary."

³ The first meetings of the body of men afterwards organized as the Royal Society appear to have taken place during the Revolution and in the time of

It was not until long after the middle of the last century that any scientific society was permanently established in North America, although serious but fruitless efforts were made in this direction as early as 1743, when Benjamin Franklin issued his circular entitled "A Proposal for promoting useful knowledge among the British plantations in America," in which it was urged "that a society should be formed of *virtuosi* or ingenious men residing in the several colonies, to be called the American Philosophical Society."

There is still in existence, in the possession of the Philosophical Society in Philadelphia, a most interesting letter from Franklin to Governor Cadwallader Colden of New York, in which he tells of the steps which had already been taken for the formation of a scientific society in Philadelphia, and of the means by which he hoped to make it of great importance to the colonies.

Our forefathers were not yet prepared for the society, nor for the *American Philosophical Miscellany* which Franklin proposed to issue, either monthly or quarterly. There is no reason to believe that the society ever did any thing of importance. Franklin's own attention was soon directed exclusively to his electrical researches, and his society languished and died.

Some twenty years later, in 1766, a new organization was attempted under the title of "The American Society held at Philadelphia for Promoting Useful Knowledge."¹ Franklin,

Cromwell, and as early as 1645, we are told by Wallace, weekly meetings were held of "diverse worthy persons inquisitive into natural philosophy and other parts of human learning, and particularly of what has been called the *New Philosophy*, or *Experimental Philosophy*," and it is more than probable that this assembly of philosophers was identical with the "Invisible College" of which Boyle spoke in sundry letters written in 1646 and 1647. These meetings continued to be held, sometimes at the Bull-Head Tavern, in Cheapside, but more frequently at Gresham College, until 1660, when the first record book of this society was opened. Among the first entries is a reference to a design then entertained "of founding a College for the promoting of Physico-Mathematicall Experimentall Learning." Dr. Wilkins was appointed chairman of the society, and shortly after, the king, Charles II., having become a member, its regular meeting-place was appointed to be in Gresham College.

¹ This name was adopted in 1768 to replace that first adopted in 1766, which was "The American Society for Promoting and Propagating Useful Knowledge, held in Philadelphia."

although absent in England, was elected its president, and the association entered upon a very promising career.

In the meantime the few surviving members of the first "American Philosophical Society" formed, under the old name, an organization which in many particulars was so unlike that proposed in 1743 that it might almost be regarded as new rather than a revival. Its membership included many of the most influential and wealthy colonists, and the spirited manner in which it organized a plan for the observation of the transit of Venus in 1769 gave it at once a respectable standing at home and abroad.

In 1769, after negotiations which occupied nearly a year, the two societies were united,¹ and "The American Philosophical Society held at Philadelphia for Promoting Useful Knowledge," has from that time until now, maintained an honorable position among the scientific organizations of the world.

The Society at once began the publication of a volume of memoirs, which appeared in 1771 under the name of "The American Philosophical Transactions."²

From 1773 to 1779 its operations were often interrupted. In the minutes of the meeting for December, 1774, appears

¹ Some insight into the scientific politics of the time may be gained by reading the following extract from a letter addressed to Franklin by Dr. Thomas Bond, June 7, 1769: "I long meditated a revival of our American Philosophical Society, and at length thought I saw my way clear in doing it, but the old party leaven split us for a time. We are now united, and with your presence may make a figure; but till that happy event I fear much will not be done. The Assembly have countenanced and encouraged us generously and kindly, and we are much obliged to you for your care in procuring the telescope, which was used in the late observations of the transit of Venus."

² A copy of the finished volume of the Transactions was presented to each member of the Pennsylvania Assembly, accompanied by an address as follows: "As the various societies which have of late years been instituted in Europe have confessedly contributed much to the more general propagation of knowledge and useful arts, it is hoped it will give satisfaction to the members of the honorable House to find that the Province which they represent can boast of the first society and the first publication of a volume of Transactions for the advancement of the useful knowledge of this side of the Atlantic; a volume which is wholly American in composition, printing, and paper, and which, we flatter ourselves, may not be thought altogether unworthy of the attention of men of letters in the most improved parts of the world."

the following remarkable note in the handwriting of Dr. Benjamin Rush, one of the secretaries, soon after to be one of the signers of the Declaration of Independence:

"The act of the British Parliament for shutting up the port of Boston, for altering the charters and for the more impartial administration of justice in the province of Massachusetts Bay, together with a bill for establishing popery and arbitrary power in Quebec, having alarmed the whole of the American colony, the Members of the American Philosophical Society partaking with their countrymen in the distress and labours brought upon their country, were obliged to discontinue their meetings for some months until a mode of opposition to the said acts of parliament was established, which we hope may restore the former harmony and maintain a perpetual union between Great Britain and the Americas."

This entry is especially interesting, because it emphasizes the fact that among the members of this infant scientific society were many of the men who were most active in the organization of the Republic, and who, under the stress of the times, abandoned the quiet pursuits of science, and devoted themselves to the national interests which were just coming into being.

Franklin was President from its organization until his death in 1790. He was at the same time President of the Commonwealth of Pennsylvania, and a member of the Constitutional Convention, and the eminence of its leader probably secured for the body greater prestige than would otherwise have been attainable. The society, in fact, soon assumed national importance, for, during the last decade of the century and for many years after, Philadelphia was the metropolis of American science and literature.

Directly after the Revolution, a similar institution was established in Boston—The American Academy of Arts and Sciences,—which was incorporated by the Legislature of Massachusetts in 1780, and published its first Memoirs in 1785. This, like the Philadelphia society, owed its origin to the efforts of a great statesman. We find the whole history in the memoirs of John Adams, a man who believed, with Washington, that scientific institutions are the best lasting protection of a popular government.

In a memorandum written in 1809, Mr. Adams gave his recollections of the circumstances which led to his deep and lasting interest in scientific foundations.

"In travelling from Boston to Philadelphia, in 1774, 5, 6 and 7, I had several times amused myself at Norwalk in Connecticut, with the very curious collection of birds and insects of American production made by Mr. Arnold;¹ a collection which he afterwards sold to Governor Tryon, who sold it to Sir Ashton Lever, in whose apartments in London I afterwards viewed it again. This collection was so singular a thing that it made a deep impression upon me, and I could not but consider it a reproach to my country, that so little was known, even to herself, of her natural history.

"When I was in Europe, in the years 1778 and 1779, in the commission to the King of France, with Dr. Franklin and Mr. Arthur Lee, I had opportunities to see the King's collection and many others, which increased my wishes that nature might be examined and studied in my own country, as it was in others.

"In France among the Academicians, and other men of science and letters, I was frequently entertained, with inquiries concerning the Philosophical Society of Philadelphia, and with eulogiums on the wisdom of that institution, and encomiums on some publications in their Transactions. These conversations suggested to me the idea of such an establishment in Boston, where I knew there was as much love of science, and as many gentlemen who were capable of pursuing it, as in any other city of its size.

"In 1779, I returned to Boston on the French Frigate 'La Sensible,' with the Chevalier de la Luzerne and M. Marbois.² The Corporation of Harvard College gave a public dinner in honor of the French Ambassador and his suite, and did me the honor of an invitation to dine with them. At table in the Philosophy Chamber, I chanced to sit next to Dr. Cooper.³ I entertained him during the whole of the time we were together, with an account of Arnold's collections, the collection I had seen in Europe, the compliments I had heard in France upon the Philosophical Society of Philadelphia, and concluded with proposing that the future legislature of Massachusetts should institute an Academy of Arts and Sciences.

¹ Some local antiquary may make an interesting contribution to the literature of American museum-work by looking up the history of this collection.

² The Chevalier Anne César de la Luzerne [1741-1821] was French Minister to the United States from 1779 to 1783, afterwards Minister to England. M. François de Barbé Marbois [1745-1837] was his Secretary of Legation, and after the return of his chief to France, was *chargé d'affaires* until 1785. For many interesting facts, not elsewhere accessible, concerning the career of these men in the United States, and their acquaintance with Adams, see John Durand's admirable "New Materials for a History of the American Revolution." New York: Henry Holt & Co., 1889. 12°, pp. i-vi, 1-310.

³ Rev. Samuel Cooper, D.D. [1725-83], an eminent patriot, long pastor of Brattle Street Church in Boston, and a leading member of the corporation of Harvard. He was the first president of the American Academy of Arts and Sciences.

"The Doctor at first hesitated, thought it would be difficult to find members who would attend to it; but the principal objection was, that it would injure Harvard College, by setting up a rival to it, that might draw the attention and affections of the Public in some degree from it. To this I answered,—first, that there were certainly men of learning enough that might compose a society sufficiently numerous; and secondly, that instead of being a rival to the University, it would be an honor and an advantage to it. That the President and principal professors would, no doubt, be always members of it; and the meetings might be ordered, wholly or in part, at the College and in that room. The Doctor at length appeared better satisfied; and I entreated him to propagate the idea and the plan, as far and as soon as his discretion would justify. The Doctor did accordingly diffuse the project so judiciously and effectually, that the first legislature under the new constitution adopted and established it by law. Afterwards when attending the convention for forming the constitution, I mentioned the subject to several of the members, and when I was appointed by the sub-committee to make a draught of a project of a constitution, to be laid before the convention, my mind and heart were so full of this subject, that I inserted the provision for the encouragement of literature in chapter fifth, section second. I was somewhat apprehensive that criticism and objections would be made to the section, and particularly that the 'Natural History' and the 'Good humor' would be stricken out; but the whole was received very kindly, and passed the convention unanimously, without amendment."¹

¹ The provision in the State Constitution of which Mr. Adams speaks, was the following:

"THE ENCOURAGEMENT OF LITERATURE, ETC., Wisdom and knowledge, as well as virtue, diffused generally among the body of the people, being necessary for the preservation of their rights and liberties, and as these depend on spreading the opportunities and advantages of education in the various parts of the country, and among the different orders of the people, it shall be the duty of legislators and magistrates in all future periods of the commonwealth, to cherish the interests of literature and the sciences, and all seminaries of them: especially the university at Cambridge, public schools, and grammar schools in the towns, to encourage private societies and public institutions, rewards and immunities for the promotion of agriculture, arts, sciences, commerce, trades, manufactures, and a natural history of the country: to countenance and inculcate the principles of humanity and general benevolence, public and private charity, industry and frugality, honesty and punctuality in their dealings, sincerity, good humour, and all social affections and generous sentiments among the people."

"This feature of the constitution of Massachusetts," writes Mr. Adams's biographer, "is peculiar, and in one sense original with Mr. Adams. The recognition of the obligation of a State to promote a higher and more extended policy than is embraced in the protection of the temporal interests and political rights of the individual, however understood among enlightened minds, had not at that time been formally made a part of the organic law. Those clauses since inserted in other State constitutions which, with more or less of fullness, acknowledged the same principle, are all manifestly taken from this source."

The two societies are still institutions of national importance, not only because of a time-honored record of useful work, but on account of important general trusts under their control. Although all their meetings are held in the cities where they were founded, their membership is not localized, and to be a "Member of the American Philosophical Society" or a "Fellow of the American Academy," is an honor highly appreciated by every American scientific man.

The Philosophical Society (founded before the separation of the colonies) copied the Royal Society of Great Britain in its corporate name, as well as in that of its transactions, and in its ideals and methods of work took it for a model.

The American Academy, on the other hand, had its origin "at a time when Britain was regarded as an inveterate enemy, and France as a generous patron,"¹ and its founders have placed upon record the statement that it was their intention "to give it the air of France rather than that of England, and to follow the Royal Academy rather than the Royal Society."² And so in Boston, the Academy published "Memoirs," while conservative Philadelphia continued to issue "Philosophical Transactions."

In time, however the prejudice against the motherland became less intense, and the Academy in Boston followed the general tendency of American scientific workers, which has always been more closely parallel with that of England than that of continental Europe, contrasting strongly with the disposition of modern educational administrators to build after German models.

It would have been strange indeed if the deep-seated sympathy with France which our forefathers cherished had not led to still other attempts to establish organizations after the model of the French Academy of Sciences. The most ambitious of these was in connection with the "Academy of Arts and Sciences of the United States of America," whose central seat was to have been in Richmond, Virginia, and whose plan was brought to America, in 1788,

¹ Letter of Manasseh Cutler to Dr. Jonathan Stokes, August 17, 1785.

² Cutler, *l. c.*

by the Chevalier Quesnay de Beaurepaire. This project, we are told, had been submitted to the King of France and to the Royal Academy of Science, and had received an unqualified endorsement signed by many eminent men, among others by Lavoisier and Condorcet, as well as a similar paper from the Royal Academy of Paintings and Sculpture, signed by Vernet and others. A large sum was subscribed by the wealthy planters of Virginia and by the citizens of Richmond, a building was erected, and one professor, Dr. Jean Rouelle, was appointed, who was also commissioned "mineralogist-in-chief" and instructed to make natural history collections in America and Europe. The population of Virginia was far too scattered and rural to give any chance of success for a project which in its nature was only practicable in a commercial and intellectual metropolis, and the Academy died almost before it was born.

"Quesnay's scheme was not altogether chimerical," writes H. B. Adams, "but in the year 1788 France was in no position, financial or social, to push her educational system in Virginia. The year Quesnay's suggestive little tract was published was the year before the French Revolution, in which political maelstrom every thing in France went down. . . . If circumstances had favored it, the Academy of the United States of America, established at Richmond, would have become the centre of higher education, not only for Virginia, but for the whole South, and possibly for a large part of the North, if the Academy had been extended, as proposed, to the cities of Baltimore, Philadelphia, and New York. Supported by French capital, to which in large measure we owe the success of our Revolutionary War, strengthened by French prestige, by liberal scientific and artistic associations with Paris, then the intellectual capital of the world, the Academy at Richmond might have become an educational stronghold, comparable in some degree to the Jesuit influence in Canada, which has proved more lasting than French dominion, more impregnable than the fortress of Quebec."¹

¹ Copies of Quesnay's pamphlet are preserved in the Virginia State Library at Richmond, and in the Andrew D. White Historical Library of Cornell

Our forefathers in colonial times had their national universities beyond the sea, and all of the young colonists who were able to do so, went to Oxford or Cambridge for their classical degrees, and to Edinburgh and London for training in medicine, for admission to the bar, or for clerical orders. Local colleges seemed as unnecessary as did local scientific societies.

Many attempts were made to establish local societies before final results were accomplished, and the beginnings of the national college system had a similar history.

In 1619 the Virginia Company of England made a grant of ten thousand acres of land for "the foundation of a seminary of learning for the English in Virginia," and in the same year the bishops of England, at the suggestion of the king, raised the sum of fifteen hundred pounds for the encouragement of Indian education in connection with the same foundation. A beginning was made toward the occupation of the land, and George Thorpe, a man of high standing in England, came out to be superintendent of the university, but he and three hundred and forty other colonists (including all the tenants of the university) were destroyed by the Indians in the massacre of 1622.

The story of this undertaking is told by Prof. H. B. Adams in the "History of the College of William and Mary," in which also is given an account of the *Academia Virginien-sis et Oxoniensis*, which was to have been founded on an island on the Susquehanna River, granted in 1624 for the founding and maintenance of a university, but was suspended on account of the death of its projector, and of King James I., and the fall of the Virginia Company.

Soon after, in 1636, came the foundation of Harvard,

University, as well as in a certain private library in Baltimore. A full account of this enterprise may be found in Herbert B. Adams's "Thomas Jefferson and the University of Virginia," pp. 21-30, and other records occur in Mordecai's "Richmond in By-gone Days" (2d edition, pp. 198-208), and in Goode's "Virginia Cousins," p. 57.

The building erected for the Academy of Sciences was the meeting-place of the convention of patriots and statesmen who ratified in 1788 the Constitution of the United States, and subsequently was the principal theatre of the city of Richmond.

then in 1660 William and Mary, Yale in 1701, the College of New Jersey in 1746, the University of Pennsylvania in 1751, Columbia in 1754, Brown in 1764, Dartmouth in 1769, the University of Maryland in 1784, that of North Carolina in 1789-95, that of Vermont in 1791, and Bowdoin (the college of Maine) in 1794.

When Washington became President, one hundred years ago, there were no scientific foundations within this republic save the American Academy in Boston, and in the American Philosophical Society, Bartram's Botanic Garden, the private observatory of Rittenhouse, and Peale's Natural-History Museum, Philadelphia.

Washington's own inclinations were all favorable to the progress of science; and Franklin, who would have been Vice-President but for his age and weakness, Adams, the Vice-President, and Jefferson, Secretary of State, were all in thorough sympathy with the desire of their chief to "promote as objects of primary importance institutions for the general diffusion of knowledge." All of them were Fellows of the American Philosophical Society, and the President took much interest in its proceedings: the records of the Society show that he nominated for foreign membership the Earl of Buchan, President of the Society of Scottish Antiquaries, and Dr. James Anderson.

Washington's mind was scientific in its tendencies, and his letters to the English agriculturists, Young, Sinclair, and Anderson, show him to have been a close student of physical geography and climatology. He sent out with his own hand, while President, a circular-letter to the best-informed farmers in New York, New Jersey, Pennsylvania, Maryland, and Virginia, and having received a considerable number of answers, prepared a report on the resources of the middle Atlantic States, which was the first of the kind written in America, and was a worthy beginning of the great library of agricultural science which has since emanated from our government press.

In a letter to Arthur Young, dated December 5, 1791, he manifested great interest in the Hessian fly, an insect mak-

ing frightful ravages in the wheat-fields of the Middle States, and so much dreaded in Great Britain that the importation of wheat from America was prohibited.¹ It was very possibly by his request that a committee of the Philosophical Society prepared and printed an elaborate and exhaustive report, and since its chairman was Washington's Secretary of State, it was practically a governmental affair, the precursor of subsequent Entomological Commissions, and of our Department of Economic Entomology.²

The interest of Washington in the founding of a national university, as manifested in the provisions of his last will and testament, are familiar to all, and I have been interested to learn that his thoughts were earnestly fixed upon this great project during all the years of the Revolutionary War. It is an inspiring thought, that during the long and doubtful struggle for independence, the leader of the American arms was looking forward to the return of peace, in anticipation of an opportunity to found in a central part of the rising empire an institution for the completing of the education of youths from all parts thereof, where they might at the same time be enabled to free themselves in a proper degree from local prejudices and jealousies.

Samuel Blodget in his "Economica," relates the history of the beginning of a national university.

"As the most minute circumstances are sometimes instructing for their relation to great events," he wrote, "we

¹ In an article recently published by Professor C. V. Riley, he sustains the popular belief and tradition that *Cecidomya* was introduced about the time of the Revolution, and probably by Hessian troops. He gives interesting details concerning the work of the Committee of the American Philosophical Society, and a review of recent controversies upon this subject.—See *Canadian Entomologist*, xx., p. 121.

² Before the organization of the Department of Agriculture, another step in economic entomology was taken by the general government in the publication of an official document on silk-worms :

1828. MEASE, JAMES.

20th Congress, [Doc. No. 226.] Ho. of Reps. | Silk-Worms. | — |
18th Session.

Letter | from | James Mease, | transmitting | a treatise on the rearing of silk-worms, | by Mr. De Hozze, of Munich, | with plates, &c., &c. | — |
February 2, 1828.—Read and referred to the Committee on Agriculture. |
— | Washington : | Printed by Gales and Seaton | 1828. | 8°. pp. 1-108.

relate the first we ever heard of a national university : it was in the camp at Cambridge, in October, 1775, when Major William Blodget went to the quarters of General Washington, to complain of the ruinous state of the colleges from the conduct of the militia quartered therein. The writer of this being in company with his friend and relation, and hearing General Greene join in lamenting the then ruinous state of the eldest seminary of Massachusetts, observed, *merely to console the company of friends*, that to make amends for these injuries, after our war, he hoped we should erect a noble national university, at which the youth of all the world might be proud to receive instructions. What was thus pleasantly said, Washington immediately replied to, with that inimitably expressive and truly interesting look, for which he was sometimes so remarkable: ‘ *Young man you are a prophet ! inspired to speak what I am confident will one day be realized.*’ He then detailed to the company his impressions, that all North America would one day become united : he said that a Colonel Byrd,¹ of Virginia, was the first man who had pointed out the best central seat [for the capital city] *near to the present spot*, or about the falls of the Potomac. General Washington further said that a Mr. Evans² had expressed the same opinion with many other gentlemen, who, from a cursory view of a chart of North America, received this natural and truly correct impression. The look of General Washington, the energy of his mind, his noble and irresistible eloquence, all conspired so far to impress *the writer* with these subjects, that if ever he should unfortunately become insane it will be from his anxiety *for the federal city and national university.*”³

In another part of the same book, Mr. Blodget describes

¹ Probably the third William Byrd [1728-1777], the son of the author of the “Westover Papers.” He was Colonel of the Second Virginia Regiment in 1756, and perhaps was in camp with Washington on the present site of the capital, when he became so deeply impressed with the eligibility of the site for a national city.

² Perhaps Lewis Evans, the geographer, who in 1755 published a map of the central colonies, including Virginia.

³ “Economica,” p. 22.

a conversation with Washington, which took place after the site of the capital had been decided upon, in which the President "stated his opinion that till there were 4 or 5,000 inhabitants in the city of Washington and until Congress were comfortably accommodated, it might be premature to commence a seminary. . . . He did not wish to see the work commenced until the city was prepared for it, but he added that he hoped he had not omitted to take such measures as would at all events secure the entire object in time, even if its merits should not draw forth from every quarter the aid it would be proud to deserve," alluding, of course, to the provisions in his own will. "He then," continues Blodget, "talked again and again on Mr. Turgot's and Dr. Price's calculations of the effect of compound interest, at which, as he was well versed in figures, he could acquit himself in a masterly manner."¹

Concerning the fate of the Potomac Company, a portion of whose stock was destined by Washington as a nucleus for the endowment of a university, it is not necessary now to speak. The value of the bequest was at the time placed at five thousand pounds sterling, and it was computed by Blodget, that had Congress kept faith with Washington, as well as did the Legislature of Virginia in regard to the endowment of Washington College, his donation at compound interest, would in twelve years (1815) have grown to \$50,000 and in twenty-four (1827) years \$100,000, an endowment sufficient to establish one of the colleges in the proposed university.

Madison, when a member of the Constitutional Convention in 1787, probably acting in harmony with the wishes of Washington, proposed as among the powers proper to be added to those of the General Legislature, the following:

"To establish a university.

"To encourage, by premiums and provisions, the advancement of useful knowledge, and the discussion of science."²

That he never lost his interest in the university idea is

¹ *Id.*, App., p. ix.

² "Madison Papers," i., pp. 354 and 577.

shown by his vigorous appeal while President, in his message of December, 1810, in which he urged the importance of an institution at the capital which would "contribute not less to strengthen the foundations than to adorn the structure of our system of government."

Quite in accord with the spirit of Madison's message was a letter in the *Pennsylvania Gazette* of 1788,¹ in which it was argued that the new form of government proposed by the framers of the Constitution could not succeed in a republic, unless the people were prepared for it by an education adapted to the new and peculiar situation of the country, the most essential instrument for which should be a federal university. Indeed the tone of this article, to which my attention has recently been directed by President Welling, was so harmonious with that of the previous and subsequent utterances of Madison, as to suggest the idea that he, at that time a resident of Philadelphia, may have been its author. It is more probable, however, that the writer was Benjamin Rush, who in 1787 issued an "Address to the People of the United States,"² which began with the remark that there is nothing more common than to confound the terms of *American Revolution* with those of *the late American war*.

"The American war is over," he said, "but this is far from being the case with the American Revolution. On the contrary, nothing but the first act of the great drama is closed. It remains yet to establish and perfect our new forms of government; and to prepare the principles, morals, and manners of our citizens for these forms of government after they are established and brought to perfection."³

And then he went on to propose a plan for a national university, of the broadest scope, with postgraduate scholarships, a corps of travelling correspondents, or fellows, in connection with the consular service, and an educated civil service, organized in connection with the university work.

¹ See Appendix A.

² See Appendix B.

³ The "Society of Sons of the American Revolution," recently organized, and composed of descendants of Revolutionary soldiers and patriots, has for one of its objects, "to carry out Washington's injunction 'to promote as objects of primary importance institutions for the diffusion of knowledge' and thus to create an enlightened public opinion."

In "Economica," the work just quoted, printed in 1806, the first work on political economy written in America, Blodget referred to the national university project as an accepted idea, held in temporary abeyance by legislative delays.

Blodget urged upon Congress various projects which he thought to be of national importance, and among the first of these was "To erect, or at least to point out the place for the statue of 1783, and either to direct or permit the colleges of the University formed by Washington to commence around this statue after the manner of the Timoleon-ton of Syracuse."¹

In intimate connection with his plan for a university was that of Washington for a military academy at West Point. He had found during the Revolution a great want of engineers, and this want caused Congress to accept the services of numerous French engineers to aid our country in its struggle for independence.

At the close of the Revolution Washington lost no time in commending to Virginia the improvement of the Potomac and James rivers, the junction by canal of Chesapeake Bay and Albemarle Sound of North Carolina. He soon after proceeded to New York to see the plans of General Schuyler to unite the Mohawk with the waters of Lake Ontario, and to Massachusetts to see the plans of the Merrimac Navigation Company.

It was the want of educated engineers for work of this kind that induced Generals Washington, Lee, and Huntington, and Colonel Pickering, in the year 1783, to select West Point as a suitable site for a military academy, and at that

¹ 1806 Blodget, Samuel, Jr. *Economica* : | A Statistical Manual | for the | United States of America. | = | The legislature ought to make the people happy | Aristotle on government | = | "Felix qui potuit rerum cognoscere causas" | = | City of Washington : | Printed for the author. | = | 1806, 128 i-viii, 1-202 i-xiv.

The certificate of copyright is in this form :

Be it remembered that — Samuel Blodget Jr. hath deposited in this office the title of a book the right whereof he claims as author, but *for the benefit in trust for the free education fund of the university founded by George Washington in his last will,*" etc.

place such an institution was essayed, under the law of Congress, in 1794. But from the destruction of the building, and its contained books and apparatus by fire, the Academy was suspended until the year 1801, when Mr. Jefferson renewed the action of the law, and in the following year, 1802, a United States Corps of Engineers and Military Academy was organized by law, and established at West Point, with General Jonathan Williams, the nephew of Franklin, and one of the vice-presidents of the Philosophical Society at its head, and the United States Military Philosophical Society was established with the whole engineer corps of the army for a nucleus.

This society had for its object "the collecting and disseminating of military science." Its membership during the ten years of its existence included most of the leading men in the country, civilians as well as officers in the army and navy. Meetings were held in New York and Washington, as well as in West Point, and it seems to have been the first national scientific society.¹

The Patent Office also began under Washington, the first American patent system having been founded by act of Congress, April 10, 1790.

On the 8th of January, 1790, President Washington entered the Senate chamber, where both Houses of Congress were assembled, and addressed them upon the state of the new nation. In the speech of a few minutes, which thus constituted the first annual message to Congress, about a third of the space was given to the promotion of intellectual objects—science, literature, and arts. The following expression may perhaps be regarded as the practical origination of

¹ At least three fascicles of "Extracts from the Minutes of the United States Military Society" were printed—one for the stated meeting, Oct. 6, 1806 [4°, 14 pp.]; one for an occasional meeting at Washington, Jan. 30, 1808 [4°, pp. 1-23 (1)]; and one for an occasional meeting at New York, Dec. 28, 1809 [4°, pp. 1-22]. The MS. Records, in four volumes, are said to be in the possession of the New York Historical Society.

I am indebted to Col. John M. Wilson, U. S. A., Supt. of the Military Academy, and to Gen. J. C. Kelton, U. S. A., for courteous and valuable replies to my letters of inquiry.

our patent system : " I cannot forbear intimating to you the expediency of giving effectual encouragement, as well to the introduction of new and useful inventions from abroad, as to the exertions of skill and genius in producing them at home."

This of course was in direct pursuance of the constitutional enactment, bethought and inserted toward the closing days of the Convention in September, 1787, empowering Congress with such authority. Each House, the Senate on the 11th and the Representatives on the 12th, sent a cordial response to the President's address, reciting the particulars of his discourse, and promising, especially to his suggestions for encouragement of science and arts, "such early attention as their respective importance requires"; and the lower House proceeded rapidly with the work. January 15th it was resolved that the various measures indicated by the President should be referred to select committees respectively; and on the 25th, such a committee was formed to consider the encouragement of the "useful arts." It consisted of Edamus Burke, of South Carolina, a Justice of the Supreme Court of that State, and native of Ireland; Benjamin Huntington, of Connecticut; and Lambert Cadwalader, of New Jersey. On the 16th of February, Mr. Burke reported his bill, which passed to its second reading the following day. It was copiously discussed and amended in Committee of the Whole, particularly March 4th, when "the clause which gives a party a right to appeal to a jury from a decision of referees, it was moved should be struck out." After a good deal of pointed and profitable remark as to the true sphere and function of juries, the motion for striking out was carried.

The next day, March 5th, the bill was ordered to be engrossed, and on the 10th, after third reading, it passed, and was carried to the Senate. Here, in a few days, it was referred to a committee of which Charles Carroll, of Maryland, was chairman, and reported back the 29th of March, where it passed, with twelve amendments, on the 30th. On the 8th of April it went forward with the signatures of

Speaker and Vice-President to the President, who approved it April 10, 1790.¹ The first patent was granted on the 31st of the following July, to Samuel Hopkins, of Vermont, for making "pot and pearl ashes"; and two more during that year.²

Thomas Jefferson, Secretary of State at this period, under which department especially the patent system grew up for more than half its first century, took so keen an interest in its aim and workings, and gave such searching personal attention to the issue of the several patents, that he has been quite naturally reputed as the father of our Patent Office, and it seems to have been supposed that the bill itself creating it proceeded from his own suggestion. But by a comparison of dates this appears hardly possible. Jefferson returned from Europe to Norfolk and Monticello toward the end of 1789, his mind deeply occupied with the stirring movements of revolution abroad; during the winter months he was debating whether he should accept the charge of the State Department offered him by Washington, making his way by slow stages from Virginia to New York, receiving innumerable ovations, paying his last visit to the dying Franklin, and he only reached the seat of government March 21st, when the legislative work on this act was practically finished. More than to any other individual probably the American patent system looks for its origin to the Father of the Country.³

Jefferson took great pride in it, and gave personal consideration to every application that was made for patents during the years between 1790 and 1793, while the power of revision and rejection granted by that act remained in force. It is a matter of tradition, handed down to us from generation to generation, that, when an application for a patent was made, he would summon Mr. Henry Knox, of Massa-

¹ "Statutes at Large," vol. i., pp. 109-112.

² Among the treasures of the National Museum is a patent dated 1796, signed by Washington as President and Pickering as Secretary of State.

³ The foregoing paragraphs concerning the history of the Patent Office were kindly supplied by Mr. Edward Farquhar, for many years its Assistant Librarian.

chusetts, who was Secretary of War, and Mr. Edmund Randolph, of Virginia, who was Attorney-General, these officials being designated by the act, with the Secretary of State, a tribunal to examine and grant patents; and that these three distinguished officials would examine the application critically, scrutinizing each point of the specification and claims carefully and vigorously. The result of this examination was that, during the first year, a majority of the applications failed to pass the ordeal, and only three patents were granted. Every step in the issuing of a patent was taken with great care and caution, Mr. Jefferson thinking always to impress upon the minds of his officers and the public that it was a matter of no ordinary importance.

The subsequent history of the office is very interesting, especially since it contains a record of Mr. Jefferson's vigorous opposition to the change effected by the act of 1793, which he held, by a promiscuous granting of exclusive privileges, would lead to the creation of monopoly in the arts and industries, and was against the theory of a popular government, and would be pernicious in its effects.

In 1812 a building was put up for the accommodation of the office, but this was destroyed in 1836, and with it most of the records which would be necessary for a proper understanding of the early history of American invention.

In the Patent-Office building, and with it destroyed, there was gathered a collection of models, which was sometimes by courtesy called the "American Museum of Art," and which afforded a precedent for the larger collection of models and natural products, which remained under the custody of the Commissioner of Patents until 1858, when it was transferred to the Smithsonian Institution, and became a part of the present National Museum.

In 1836 the patent system was reorganized, and most of the methods at present in use were put in operation. As it now stands, it is one of the most perfect and effective in the world, and the Patent Office, judged by the charac-

ter of the work it performs, although, perhaps, not strictly to be classed among the scientific institutions, is, nevertheless, entitled to such a place by reason of its large and admirable corps of trained scientific experts serving on the staff of examiners.¹

The administration of John Adams, beginning in 1797, was short and turbulent. Political strife prevented him from making any impression upon our scientific history; but it requires no research to discern the attitude of the man who founded the American Academy, and who drew up the articles for the encouragement of literature and science in the Constitution of Massachusetts.

Jefferson, as Vice-President, taking little part in the affairs of the Administration, was at liberty to cultivate the sciences. When he came to Philadelphia to be inaugurated Vice-President, he brought with him a collection of the fossilized bones of some large quadruped, and the manuscript of a memoir upon them, which he read before the American Philosophical Society, of which he had been elected president the preceding year.

"The spectacle of an American Statesman, coming to take part as a central figure in the greatest political ceremony of our country, and bringing with him an original contribution to science, is certainly," as Luther has said, "one we shall not soon see repeated."²

In 1801 began the administration most memorable in the history of American science. The President of the United States was, during the eight years of his office, President of

¹ See *Official Gazette*, U. S. Patent Office, vol. xii., No. 15, Tuesday, Oct. 9, 1877; also articles in Appleton's and Johnson's Cyclopædias.

The history of the Patent Office has never been written; a full account of its work, and of its influence upon the progress of American invention is greatly to be desired.

² See Jefferson, "A Memoir on the Discovery of Certain Bones of a Quadruped, of the Clawed Kind, in the Western Part of Virginia," in the *American Philosophical Transactions*, IV., p. 246, (March 10, 1797); also F. B. Luther, "Jefferson as a Naturalist," in the *Magazine of American History*, March, 1885, pp. 379-390.

the American Philosophical Society as well, and was in touch with all the intellectual activities of the period. He wrote to a correspondent: "Nature intended me for the tranquil pursuits of science by rendering them my supreme delight," and to another he said: "Your first letter gives me information in the line of natural history, and the second promises political news; the first is my passion, the last is my duty, and therefore both desirable."

"At times of the fiercest party conflict," says Luther, "when less happily constituted minds would scarcely have been able to attend to the routine duties of life, we find him yielding to that subtle native force which all through life was constantly drawing him away from politics to science."

Thus during these exciting weeks in February, 1801, when Congress was vainly trying to untangle the difficulties arising from the tie vote between Jefferson and Burr, when every politician at the capital was busy with schemes and counter-schemes, this man, whose political fate was balanced on a razor's edge, was corresponding with Dr. Wistar in regard to some bones of the mammoth which he had just procured from Shawangunk in New York. Again, in 1808, when the excitement over the "Embargo" was highest, and when every day brought fresh denunciations of him and his policy, he was carrying on his geological studies in the White House itself. Under his direction upward of three hundred specimens of fossil bones had been brought from the famous Big Bone Lick and spread in one of the large unfinished rooms of the Presidential mansion. Dr. Wistar was asked to come to Philadelphia and select such as were needed to complete the collection of the Philosophical Society. The exploration of the lick was made at the private expense of Jefferson through the agency of General William Clarke, the Western explorer, and this may fairly be regarded as the beginning of American governmental work in paleontology.

His scientific tendencies led to much criticism, of which the well-known lines by William Cullen Bryant, in "The Em-

bargo," afford a very mild example.¹ He cast all calumny aside with the remark "that he who had nothing to conceal from the press had nothing to fear from it," and calmly went on his way. The senior members of his Cabinet were James Madison, a man of the most enlightened sympathy with science, and Gallatin, one of the earliest American philologists; while one of his strongest supporters in Congress was Samuel Latham Mitchill, a mighty promoter of scientific interests in his native State, whom Adams wittily describes as "chemist, botanist, naturalist, physician, and politician, who supported the Republican party because Jefferson was its leader, and Jefferson because he was a philosopher."

During this administration the project for a great national institution of learning was revived by Joel Barlow. In 1800, when Barlow was the American Minister in Paris, he said in a letter to Senator Baldwin: "I have been writing a long letter to Jefferson on quite another subject. It is about learned societies, universities, public instruction, and the advantages you and I have of doing something great and good if you will take it up on proper principles. If you will put me at the head of the institution, as I propose, and give it that support which you ought to do, you can't imagine what a garden it would make of the United States. I have a great project, and only want the time and means to carry it into effect."²

M. Dupont de Nemours was also corresponding with Jefferson upon the same subject, and his work, "*Sur l'Education Nationale dans les Etats Unis*," published in Paris in 1800, was written at his request.³

Barlow returned to the American States in 1805, and almost his first public act after his arrival, we are told, was

¹ "Go, wretch, resign the Presidential chair;
Disclose thy secret measures, foul or fair.
Go, search with curious eyes for hornèd frogs
'Mid the wild wastes of Louisianian bogs,
Or where the Ohio rolls his turbid stream
Dig for huge bones, thy glory and thy theme."

² Todd, "Life and Letters of Joel Barlow," p. 208.

³ Adams: "Jefferson and the University of Virginia," p. 49, *et seq.*

to issue a prospectus in which he forcibly and eloquently depicted the necessity and advantages of a National Scientific Institution.

This was to consist of a central university at or near the seat of government, and, as far as might seem practicable or advisable, other universities, colleges, and schools of education, either in Washington or in other parts of the United States, together with printing-presses for the use of the Institution, laboratories, libraries, and apparatus for the sciences and the arts, and gardens for botany and agricultural experiments.

The Institution was to encourage science by all means in its power, by correspondence, by premiums and by scholarships, and to publish school-books at cost of printing.

The Military and Naval Academies, the Mint, and the Patent Office were to be connected with the university, and there was also to be a general depository of the results of scientific research and of the discoveries by voyages and travels, actually the equivalent of a national museum.

"In short," wrote Barlow, "no rudiment of knowledge should be below its attention, no height of improvement above its ambition, no corner of an empire beyond its vigilant activity for collecting and diffusing information."¹

The editor of the *National Intelligencer*, the organ of the administration in 1806, commented favorably upon the plan of Barlow.

"This gentleman," wrote he, "whose mind has been enlarged by extensive observation, by contemplating man under almost every variety of aspect in which he appears, and whose sentiments have been characterized by an uniformly zealous devotion to liberty, has most justly embraced the opinion that the duration as well as perfection of republicanism in this country will depend upon the prevalence of correct information, itself dependent upon the education of the great body of the people. Having raised himself, as we understand, to

¹ See text of prospectus in Appendix C to this paper, or in *National Intelligencer*, Washington, 1806, August 1st, and November 24th. The original publication, of which there is a copy in the Congressional Library, recently brought to my notice by Mr. Spofford, is a pamphlet, anonymously published, with the date of Washington, 24th January, 1806.—

Prospectus | of a | National Institution, | to be | established | in the | United States | = | Washington City : | Printed by Samuel H. Smith | ——— | 1806—
8°, pp. 1-44.

a state of pecuniary independence, he has returned to his native country, with a determination of devoting his whole attention and labors to those objects which are best calculated to improve its state of society, its science, literature, and education. The disinterested exertions of such a man merit the national attention."¹

Barlow's prospectus, we are told, was circulated throughout the country, and met with so favorable a response that in 1806 he drew up a bill for the incorporation of the Institution, which Mr. Logan, of Philadelphia, introduced in the Senate, which passed to a second reading, was referred to a committee which never reported, and so was lost.

Barlow's National Institution resembled more closely the House of Salomon in "The New Atlantis" of Bacon than it did the eminently practical university project of Washington. It would be interesting to know to what extent President Jefferson was in sympathy with Barlow. The mind which a few years later directed the organization of the University of Virginia, could scarcely have approved all the features of the Kalorama plan. He was undoubtedly at this time anxious that a national university should be founded, as is shown by his messages to Congress in 1806 and 1808,² though it is probable that he wished it to be erected in some convenient part of Virginia, rather than in the city of Washington. The project for transplanting to America the Faculty of the College of Geneva, which, but for the opposition of Washington, would probably have been attempted in 1794, had reference rather to the formation of a State University, national in influence, than to a central federal institution.³

Although Barlow's plan was, in its details, much too elaborate for the times, the fundamental ideas were exceedingly attractive, and led to very important and far-reaching results.

Barlow expected, of course, that his Institution should be established and maintained at government cost. This was soon found to be impracticable, and those who were inter-

¹ *National Intelligencer*, Nov. 24, 1806.

² Henry Adams: "History of the United States," 1805-1809, i., 346, 347; ii., 365.

³ Adams: *op. cit.*, pp. 45-6.

ested in the intellectual advancement of the capital soon had recourse to the idea of beginning the work at private expense, relying upon government aid for its future advancement.

Barlow's classmate, Josiah Meigs, his friend and neighbor Thomas Law, aided by Edward Cutbush, Judge Cranch, and other citizens of Washington proceeded, forthwith, to attempt that which the politicians dared not.

The essential features of Barlow's plan were:

1. The advancement of knowledge by associations of scientific men; and

2. The dissemination of its rudiments by the instruction of youth.¹

To meet the first of these requirements they organized the Columbian Institute for the Promotion of Arts and Sciences, in 1819; and for the second, the Columbian College, incorporated in 1821. Most of the prominent members of the Columbian Institute were also among the friends and supporters of the college. Dr. Josiah Meigs, the friend and classmate of Barlow, the president of the institute from 1819 to 1821, was an incorporator, and a member of the first faculty of the college.²

Dr. Edward Cutbush, the founder of the Columbian Institute, was also a professor, as well as Dr. Thomas Sewall, Dr. Alexander McWilliams, and Judge William Cranch, and in publications made at the time these men distinctly proposed to realize the aspirations of Washington, for the creation of a great National University at the seat of the Federal Government. It was in this cause President Monroe gave to the Columbian College his public support as President of the United States. At a later day, when an hour of need overtook the college, John Quincy Adams became one of its saving benefactors.³

¹ "The Old Bachelor," by William Wirt, p. 186.

² I am indebted to Dr. James C. Welling, President of the Columbian University, for much important information concerning this and other matter discussed in the present paper.

³ James C. Welling: "The Columbian University," Washington, 1889, p. 1.

The following letter, written by President Monroe in 1821, indicates that the

The Columbian Institute was granted the use of rooms in the Capitol building under the present Congressional Library Hall, which became a centre of the scientific and literary interests of Washington, and its annual meetings were held in the Hall of the House of Representatives, where Southard, Clay, Everett, Meigs and Adams delivered addresses upon matters of science and political economy to large assemblages of public men. In 1819, Josiah Meigs, its president, writing to Dr. Daniel Drake, of Cincinnati, said :

"I have little doubt that this Congress will, before they rise, give the Institute a few acres of ground for our build-

public men of the day were not unwilling that the institution should be regarded as one of national scope :

WASHINGTON, March 28, 1821.

SIR :

I avail myself of this mode of assuring you of my earnest desire that the College which was incorporated by an Act of Congress at the last session, by the title of "The Columbian College in the District of Columbia" may accomplish all the useful purposes for which it was established ; and I add, with great satisfaction, that there is good reason to believe that the hopes of those who have so patriotically contributed to advance it to its present stage will not be disappointed.

Its commencement will be under circumstances very favorable to its success. The act of incorporation is well digested, looks to the proper objects, and grants the powers well adapted to their attainment. The establishment of the institution within the Federal District in the presence of Congress, and of all the departments of the government will secure to the young men who may be educated in it many important advantages, among which the opportunity which it will afford them of hearing the debates in Congress and in the Supreme Court, on important subjects, must be obvious to all.

With these peculiar advantages, this institution, if it receives hereafter the proper encouragement, cannot fail to be eminently useful to the nation. Under this impression, I trust that such encouragement will not be withheld from it.

I am, Sir, with great respect,

Your very obedient servant,

JAMES MONROE.

The donation of \$25,000 made to the Columbian College in 1832 was preceded by a report from the Committee in House of Representatives on District of Columbia.

That report may be found in "Reports of Committees, First Session, 22d Congress (1831-2)," vol. iii., Report No. 334.

After reciting the early history of the college the report proceeds as follows :

"Few institutions present as strong claims to the patronage of Government as that in behalf of which the forementioned memorial has been presented.

ing and for a Botanic Garden. Mr. Barlow made great efforts to obtain this object eight or ten years ago. He could do nothing—but prejudices which then were of the density of a thunder-cloud are now as tenuous as the tail of a comet.”¹

On the ground granted by Congress, a botanical garden was established by the Society, in 1822, or 1823, with the co-operation of the State Department and the consular service. In 1829 the Society applied to Congress for pecuniary aid, which was not granted.²

(The Report is made in answer to a memorial of the President and Trustees of the College, asking Congress to make a donation to the College ‘from the sale of public lots or from such other source as Congress may think proper to direct.’) Its location near the seat of Government, its salubrious middle climate, and other advantages, and the commendable efforts of the present trustees and professors to sustain it, justly entitle it to public beneficence.

“The supreme legislative power of the United States over persons and property within the District of Columbia is unquestioned. Congress has repeatedly made grants of portions of the public lands to seminaries of learning situated within the limits of States and Territories where such lands lie. The Constitution having thus confided to the care of the National Legislature the rights and interests of the District of Columbia, and Congress having made liberal donations out of the National domain to promote the great cause of education, in all the other districts within which the General Government has exclusive jurisdiction, it would seem to be cruel injustice to refuse the small boon now recommended. These considerations induce the hope that the proposed donation will be exempt from all opposition not founded in doubts of the just claim to patronage of the institution for the benefit of which it is designed. And these claims, it is fully believed, will stand the test of the severest scrutiny.”

The report from which the above extracts are taken was made February 27, 1832 (to accompany House Bill, No. 422), by Mr. Thomas, of Maryland (on behalf of the Committee on the District of Columbia), in answer to memorial of the Trustees and the President of the Columbian College.

¹ “Life of Josiah Meigs,” p. 102.

² The original members of the Columbian Institute were: Hon. John Quincy Adams; Colonel George Bomford, U.S.A.; Dr. John A. Brereton, U.S.A.; Dr. Edward Cutbush, U.S.N.; Asbury Dickins, Esq.; Joseph Gales, Jr., Esq.; Dr. Henry Hunt; Thomas Law, Esq.; Edmund Law, Esq.; Dr. George W. May; Alexander McWilliams, Esq.; William Winston Seaton, Esq.; Samuel H. Smith, Esq.; William Thornton, Esq.; Hon. Roger C. Weightman.

Among the later members were Dr. Joseph Lovell, U.S.A.; Colonel Isaac Roberdeau; Dr. Thomas Sewell; Judge William Cranch; Hon. Henry Clay;

The Columbian University was also an applicant for government aid, which it received to the amount of \$25,000 in 1832, on the ground that it was an institution of national importance, organized by private individuals to do work legitimately within the domain of governmental responsibilities.¹

Hon. John McLean; Hon. Richard Rush; Hon. S. L. Southard; Hon. William Wirt; Dr. W. S. W. Ruschenberger, U. S. N.; Hon. J. M. Berrien; Hon. J. C. Calhoun; Rev. Obadiah Brown; and Rev. William Staughton.

The minutes of the Columbian Institute are not to be found. The treasurer's book is in the National Museum.

¹ This appropriation was made on the strength of a report by Senator Barbour, of Virginia, Chairman of the Committee on the District of Columbia, in which, after alluding to the long recognized "utility of a central literary establishment" and to the failures of the recommendations of Washington and Madison, he gave a brief history of the enterprise, which was as follows:

"At length a few enterprising and patriotic individuals attempted to achieve by voluntary donations that which it had been supposed could be effected only by the power of Congress.

"Their efforts were crowned with distinguished success. One individual in particular, the Rev. Luther Rice, with an unwearied industry and an unyielding perseverance which prompted him to traverse every part of the Union in pursuit of aid to this beneficent object, contributed principally to that success.

"The funds thus acquired were faithfully and judiciously applied to this object . . . Application was made to Congress for an act of incorporation, which passed February 9, 1821. This, however, was all the aid which Congress dispensed.

"The accompanying document shows that there have been expended in this institution \$80,000, of which only \$50,000 have been procured; and as a consequence the institution is embarrassed by a debt to the amount of \$30,000. . . . Under the circumstances the individuals who have thus generously devoted themselves to the promotion of this establishment, and who have disinterestedly pledged their independence upon the success of the College, present themselves to Congress with a view to obtain their protection by a pecuniary grant. . . .

"The committee in reviewing the peculiar circumstances which characterize the origin of this establishment, its progress, and the great benefits it promises to society, are of the opinion that the application is reasonable. It cannot be doubted that had such an establishment grown up, under similar circumstances in either of the States it would receive the helping hand of its Legislature. Congress stands in the same relation to this establishment, from its exclusive power of legislation within the District, &c., &c."

Report of Mr. Barbour from the Committee on the District of Columbia to whom was referred the Memorial of the Trustees of the Columbian College.—April 19, 1824.—Senate.—18th Congress, 1st Session (67). 80-83 pp.

The Columbian College received nearly one third of its original endowment from the government of the United States. Of the remainder perhaps one half was contributed by men like President Adams, whose sole interest in it was a patriotic one.

During Jackson's presidency all ideas of centralization, even in scientific matters, appear to have fallen into disfavor, and the Columbian Institute and the Columbian College were forced to abandon their hopes for governmental aid. The Institute languished and dropped out of existence, while the College, under the fostering care of a church organization (which finally dropped it in 1846), and through the beneficence of individuals, one of whom, a citizen of Washington, gave it property to the value of \$200,000, has grown to be a university in name and scope, and is included among the thirteen "foundations comprising groups of related faculties, colleges, or schools," enumerated in the report of the Commissioner of Education for 1886-7.

Although it has not since 1832 made any claims for government aid, nor assumed to be in any way a ward of the nation, its early history is significant, on account of its connection with the project for a National University, which has been for more than a century before the people. The government has since established in Washington City the National Deaf-Mute College, which it still maintains, and the Howard University, intended primarily for the freedman, but open to all.

The founders of the Columbian Institute and the Columbian University were building better than they knew, for they were not only advancing knowledge in their own day and generation, but they were educating public opinion for a great opportunity, which soon came in the form of a gift to the nation from beyond the sea, in the form of the Smithsonian bequest.

The story of the Smithsonian Institution is a remarkable one. Smithson was a graduate of the University of Oxford, a Fellow of the Royal Society, a chemist and mineralogist of

well recognized position. The friend and associate of many of the leading scientific men of England, he found it advisable, for reasons connected with his family history, to pass most of his life upon the Continent. A man of ample fortune, he associated with men of similar tastes, and died in 1829, leaving in trust to the United States property now amounting in value to nearly three quarters of a million of dollars, to establish at the national capital "an institution for the increase and diffusion of knowledge among men." No one has been able to explain why he did this. He had, so far as we know, no friend or correspondent in the United States, and had made known to no one his intention of establishing an institution of learning in the new world.¹

It is more than probable, however, that he knew Barlow when American Minister in Paris, and that the Prospectus of the National Institution, or the treatise by Dupont de Nemours, may have attracted his attention. He was aware of the failure of the attempts to obtain national support at the start for scientific uses, and conceived the idea of founding, with his own means, an organization which should, he foresaw, grow into national importance. Any one who will take the pains to compare the criticisms and objections to Barlow's project, as set forth in Wirt's essay in "The Old Bachelor,"² with those which were urged in Congress and the public press in opposition to the acceptance of the Smithsonian bequest thirty years later, cannot fail to be greatly impressed by the similarity of tone and argument.

The Smithsonian Institution, with its dependencies and affiliations, corresponds perhaps more closely at the present time to Barlow's "National Institution" than any organiza-

¹ The only suggestion which has ever been offered is that by Mr. W. J. Rhees, in his history of "James Smithson and his Bequest," in which he calls attention to the fact that in the library of Smithson was a copy of "Travels through North America," published in 1807, by Isaac Weld, Secretary of the Royal Society, in which he describes the city of Washington, and refers to it prophetically as likely some time to become the intellectual and political centre of one of the greatest nations of the world.

² The Old Bachelor, Baltimore: F. Lucas, jun. small 8°, pp. 1-235 page 171.

tion existing elsewhere in the world. The names of its three secretaries—Henry, the physicist (in office from 1846 to 1878); Baird, the naturalist (Assistant Secretary from 1850 to 1878; Secretary, 1878–1887); and Langley, the astronomer, suggest in a few words the main features of its history.

Recurring to Jefferson's Presidency, it should be noted that its most important scientific features were the inception of the system of scientific surveys of the public domain, and the organization of the Coast Survey. The first was most peculiarly Jefferson's own, and was the outcome of more than twenty years of earnest endeavor.

The apathy of the British government in colonial times in the matter of explorations of the American continent is inexplicable. Halley, the philosopher and mathematician, was in charge of a fruitless expedition in 1699; and Ellis, in 1746, explored Hudson's Bay under government auspices, searching for a northwest passage.

The first inland exploring expedition under government auspices seems to have been that of Governor Spotswood, of Virginia, who in 1724, accompanied by a party of young colonists, made an excursion to the summit of the Blue Ridge for the purpose of ascertaining what lay beyond.

Nothing else was done in colonial days, although it would appear that Jefferson, and doubtless others as well as he, had in mind the importance of exploring the great Northwest. In the recently published life of Matthew Fontaine Maury, the story is told of his grandfather, the Rev. James Maury, an Episcopal clergyman and instructor of youth, in Walker Parish, Albemarle County, Virginia, who numbered among his pupils three boys who afterward became Presidents of the United States, and five signers of the Declaration of Independence. He was a quiet thinker—a serene old man who gave the week to contemplative thought and to his school, and Sunday to the service of the sanctuary. In 1756 he was already dazzled by the rising glory of the new country. He was intensely interested in the great Northwest. The Missouri was a myth at that time. Cox

had ascended the Mississippi to the falls of St. Anthony, and reported the existence of such a stream, but all beyond was shrouded in mystery.

“‘But see,’ said the aged clergyman, pointing with trembling finger and eager eye to the map of the North American continent—‘see, there must be a large river in that direction; mountains are there, and beyond them there must be a stream to correspond with the vast river on this side of the chain’; and by a process of reasoning based on physical geography, he pointed out to his pupils (Thomas Jefferson among them), the existence of the line of the river as accurately as Le Verrier did the place of Neptune in the firmament, and predicted that a great highway to the West would some day be opened in this direction.”¹

It would appear that Jefferson never forgot the suggestion of his venerable teacher. While Minister of the United States in Paris in 1785, he became acquainted with John Ledyard, of Connecticut, a man of genius, of some science, and of fearless courage and enterprise, who had accompanied Captain Cook on his voyage to the Pacific. “I suggested to him,” writes Jefferson, “the enterprise of exploring the western part of our continent by passing through St. Petersburg to Kamtschatka, and procuring a passage thence in some of the Russian vessels to Nootka Sound, whence he might make his way across the continent to the United States.” He proceeded to within two hundred miles of Kamtschatka, and was there obliged to take up his winter quarters, and when preparing in the spring to resume his journey, he was arrested by an officer of the Empress of Russia, and carried back in a close carriage to Poland. “Thus,” says Jefferson, “failed the first attempt to explore the western part of our northern continent.”

In a letter to Bishop Madison, dated Paris, July 19, 1788, Jefferson tells the story of Ledyard’s failure, and of his departure on an expedition up the Nile. “He promises me,” continues Jefferson, “if he escapes through his journey, he will go to Kentucky, and endeavor to penetrate westerly to the South Sea.” Ledyard died in Africa.

¹ “Life of Matthew Fontaine Maury,” by Mrs. D. F. M. Corbin, London, 1888, p. 6.

The proposed expedition of Ledyard, though undertaken at the instance of the American Minister in Paris, can scarcely be regarded as a governmental effort. It is of interest, however, as leading up to the second attempt, which also was inspired and placed on foot by Jefferson.

"In 1792," writes Jefferson, "I proposed to the American Philosophical Society, that we should set on foot a subscription to engage some competent person to explore those regions in the opposite direction, that is, by ascending the Missouri, crossing the Stony Mountains, and descending the nearest river to the Pacific."¹

"Captain Meriwether Lewis, being then stationed at Charlottesville on the recruiting service, warmly solicited me to obtain for him the execution of that object. I told him that it was proposed that the person engaged should be attended by a single companion only, to avoid exciting alarm among the Indians. This did not deter him; but Mr. André Michaux, a professed botanist, author of the '*Flora Boreali-Americana*,' and of the '*Histoire des Chênes de l'Amérique*,' offering his services, they were accepted. He received his instructions, and when he had reached Kentucky in the prosecution of his journey, he was overtaken by an order from the Minister of France, then at Philadelphia, to relinquish the expedition, and to pursue elsewhere the botanical inquiries on which he was employed by the government, and thus failed the second attempt to explore that region."²

¹ Jefferson does not mention in this connection the well-known fact that he himself became personally responsible for raising the sum of one thousand guineas from private sources, to secure the sending out of this expedition.

² The late Dr. Asa Gray, in a letter written to me shortly before his death, remarks: "I have reason to think that Michaux suggested to Jefferson the expedition which the latter was active in sending over to the Pacific. I wonder if he put off Michaux for the sake of having it in American hands."

I think it is sufficiently evident from what has been written, that the project had been considered by Jefferson long before Michaux came into America. A statement parallel to that of Jefferson is found in the brief biography of Michaux prefixed by Prof. C. S. Sargent to his reprint of the *Journal of Andre Michaux*, published in the "Proceedings of the American Philosophical Society," vol. xxvi., No. 129, page 4: "The French Government was anxious

It is related by Jefferson, in his "memoranda of conversations," that Judge Breckenridge, of Kentucky, told him, in 1800, that Michaux was not only a botanical agent of the French, but a political emissary, and that he held a commission as commissary for an expedition against the Spaniards,

in 1785 to introduce into the Royal plantations the most valuable trees of eastern North America, and Michaux was selected for this undertaking. He was instructed to explore the territory of the United States, to gather seeds of trees, shrubs, and other plants, and to establish a nursery near New York for their reception, and afterwards to send them to France, where they were to be planted in the park of Rambouillet. He was directed also to send game-birds from America, with a view to their introduction into the plantations of American trees. Michaux, accompanied by his son, then fifteen years old, arrived in New York in October, 1785. Here during two years he made his principal residence, establishing a nursery of which all trace has now disappeared, and making a number of short, botanical journeys into New Jersey, Pennsylvania, and Maryland. The fruits of these preliminary explorations, including 12 boxes of seeds, 5,000 seedling trees, and a number of live partridges were sent to Paris at the end of the first year.

"Michaux's first visit to South Carolina was made in September, 1787. He found Charleston a more suitable place for his nurseries, and made that city his headquarters during the rest of his stay in America.

"Michaux's journeys in this country after his establishment in Charleston are detailed in the journal (printed in the place already referred to). They cover the territory of North America from Hudson's Bay to the Indian River of Florida, and from the Bahama Islands to the banks of the Mississippi River. His ambition to carry out his instructions was equalled only by his courage and industry. The history of botanical explorations accords no greater display of fortitude and enthusiasm in pursuit of knowledge than Michaux showed in his journey to the headquarters of Savannah River in December, 1788, when his zeal was rewarded by the discovery of *Shortia* on the return from his visit to Hudson's Bay. The hardship of his last journey even did not satisfy his craving for adventure and discovery, and shortly after his return he laid before the American Philosophical Society a proposition to explore the unknown region which lay beyond the Missouri. His proposition was well received. The sum of \$5,000 was raised by subscription to meet the expenses of the journey, all arrangements were made, and he was about ready to start when he was called upon by the Minister of the French Republic, lately arrived in New York, to proceed to Kentucky to execute some business growing out of the relations between France and Spain with regard to the transfer of Louisiana."

"It was this suggestion of Michaux, no doubt," says Sargent in concluding this reference, "which led Mr. Jefferson, who had regarded him with great favor, to send a few years later the first trans-continental expedition to the shores of the Pacific." Prof. Sargent, like Dr. Gray, has evidently not been in possession of the history of Jefferson's early interest in this matter.

planned by Genet in connection with a plot to gain possession of the eastern Mississippi Valley for France.¹

"In 1803," continues Jefferson, "the act of establishing trading houses with the Indian tribes being about to expire, some modifications of it were recommended to Congress by a confidential message of January 18th, and an extension of its views to the Indians on the Missouri. In order to prepare the way, the message proposed sending an exploring party to trace the Missouri to its source, to cross the highlands, and follow the best water-communication which offered itself from thence to the Pacific Ocean. Congress approved the proposition and voted a sum of money for carrying it into execution. Captain Lewis, who had then been near two years with me as private secretary, immediately renewed his solicitation to have the direction of the party."

In his life of Lewis, prefixed to the history of the expedition, Jefferson gives in full an account of Lewis's preparation for the expedition, including his instruction in astronomical observation by Andrew Ellicott, and also a full text of the instructions, signed by him, addressed to Lewis and his associate, Captain William Clarke. Captain Lewis left Washington on the 5th of July, 1803, and proceeded to Pittsburg. Delays of preparation, difficulties of navigation down the Ohio, and other obstructions retarded his arrival at Cahoki until the season was so far advanced that he was obliged to wait until the ice should break up in the beginning of spring. His mission accomplished, he returned to St. Louis on the 23d of September, 1806.

"Never," says Jefferson, "did a similar event excite more joy through the United States. The humblest of its citizens had taken a lively interest in the issue of the journey, and looked forward with impatience for the information it would furnish. The anxiety, too, for the safety of the corps had been kept in a state of excitement by lugubrious rumors circulated from time to time on uncertain authorities, and uncontradicted by letters or other direct information, from the time they had left the Mandan towns on their ascent up the river, in April of the preceding year, 1805, until their actual return to St. Louis."

The second expedition towards the West was also sent out during Jefferson's administration, being that under the com-

¹ "Jefferson's Writings," ed. T. J. Randolph, iv., pp. 513, 514.

mand of Gen. Zebulon M. Pike, who was sent to explore the sources of the Mississippi River and the western parts of "Louisiana," continuing as far west as Pike's Peak, the name of which still remains as a memorial of this enterprise.¹

The expedition of Lewis and Clarke was followed, in due course and in rapid succession, by others, some geographical, some geological, some for special researches, and some more comprehensive in character.

To those who are in the least degree familiar with the history of American exploration, the names of Long, Cass and Schoolcraft, Bonneville, Nicollet, Fremont, Sitgreaves, Wislizenus, Foster and Whitney, Owen, Stansbury, Abert, Marcy, Stevens, Gunnison, Beckwith, Whipple, Williamson, Parke, Pope, Emory, Bartlett, Bryan, Magraw, Johnston, Campbell, Warren, Twining, Ives, Beale, Simpson, Lander, McClellan, Mullan, Reynolds, Heap, Jones, Ruffner, Ludlow, Maguire, Macomb, and Stone will bring up the memory of much adventurous exploration and a vast amount of good scientific work; while to mention Hayden, Wheeler, King, and Powell is to leave the field of history and to call up the early stages of the development of that magnificent organization, the United States Geological Survey, which is still in the beginning of its career of usefulness.²

The history of the Coast Survey began with the earliest years of the century. It has been thought by some that the idea originated with Albert Gallatin, and by others that it was due to Prof. Robert Patterson,³ while Hassler, whose

¹ It is a matter of history that Alexander Wilson, the ornithologist, was anxious to be appointed the naturalist of Pike's expedition, and Jefferson has been warmly abused for not gratifying his desire. It should be borne in mind that at this time Wilson was a man whose reputation had not yet been achieved and also that it is quite possible that, in those days, as in the present, the projects of such enterprises were often hindered by lack of financial opportunity.

² The U. S. Geological Survey was organized March 3, 1879, and Clarence King was appointed its first director. Major J. W. Powell, his successor, was appointed March 18, 1881.

³ The committee of twenty, appointed in 1857 by the American Association for the Advancement of Science, to report upon the history and progress of the Coast Survey, made the following statement:

"It is believed that the honor of first suggesting a geodetic survey of the American coast, is due to the elder Professor Patterson, of Philadelphia, who, as

name is so intimately associated with its early history, seems to have supposed that it was suggested by his own advent, in 1805, bringing with him from Switzerland a collection of mathematical books and instruments.¹

Passing by the question as to who was the originator of the idea, with the simple remark that it is doubtful whether such an enterprise should not have for long years been in the minds of many Americans, it may be said that, without doubt, the early organization of the survey was due to the scientific wisdom and political foresight of Jefferson, who realized that within a few years the country would be involved in a war with Great Britain, and that a thorough knowledge of the coast was essential not only to the prosperity of the nation in time of peace, but still more to its safety in case of invasion. At that time the only charts available for our mariners were those in "The Atlantic Nep-

early as the year 1806, availed himself of his intimacy with the President, Mr. Jefferson, and the gentlemen who formed his Cabinet, to impress them with the feasibility and quality of the measure."—"Report on the History and Progress of the American Coast Survey up to the Year 1858, by the Committee of Twenty, Appointed by the Association for the Advancement of Science, at the Montreal Meeting, August, 1857" (pp. 1-88), p. 18.

¹ "I arrived in this country in October, 1805, having relinquished my public station in my native country, Switzerland, foreseeing the turn of political events which have since come to pass, and from a taste for a rural life with completely different views and means quite sufficient for them, but which I have failed to claim. Having arrived in Philadelphia, the late Professor Patterson, Mr. Garnet, of New Brunswick, and several other gentlemen, on seeing the books, mathematical instruments, etc., I had brought with me for my private enjoyment, were so kind as to show me some attention. I had occasion to show them, in conversation, by the scientific publications of Europe, that I had been engaged in an extensive survey of Switzerland, which was interrupted by the revolution. Professor Patterson sent to President Jefferson, an account of my former life, which I furnished at his request; and Mr. Clay, the Representative to Congress from Philadelphia, before setting off for Congress, in 1806, asked me if I should be willing to take a survey of the coast, to which I assented." (Letter published in the *New York American*, probably in February, 1827. *Principal Documents Relating to the Survey of the Coast of the United States since 1816*, published by F. R. Hassler, Superintendent of the Survey. New York, William Van Norton, printer, 1834. *Octavo*, pp. 1-180, I-III: *folding map*. Second Volume of the *Principal Documents Relating to the Survey of the Coast of the United States*, from October, 1834, to November, 1835. Published by F. R. Hassler, Superintendent of the Survey. New York, William Van Norton, printer, 1835. *Octavo*, pp. 1-156, 1-III (1).)

tune" of Colonel Des Barres, and the old hydrographic charts issued by the Dutch, French, and English governments. Jefferson realized that American seamen were less familiar with many portions of their own coast than were the European navigators, and he appreciated fully the importance of having a knowledge of this kind far more accurate than that which was possessed by any foreigner. "With the clear and bold perception which always distinguishes men of genius when they are trusted in times of danger with the destiny of nations, the President recommended the survey of the home coast with all the aid of the more recent discoveries in science"; and in his annual message to Congress, in the year 1807, proposed the establishment of a national survey, for the purpose of making a complete chart of the coast with the adjacent shoals and soundings.

In response to this recommendation, Congress made an appropriation of \$50,000 for the purpose of carrying out the provision of the following law :

AN ACT TO PROVIDE FOR SURVEYING THE COAST OF THE UNITED STATES.

Be it enacted, &c. That the President of the United States shall be, and he is hereby authorized and requested to cause a survey to be taken of the coast of the United States, in which shall be designated the islands and shoals, in the roads or places of anchorage, within 20 leagues of any part of the shores of the United States; and also their respective courses and distances between the principal capes, or head lands, together with such other matters as he may deem proper for completing an accurate chart of every part of the coast within the extent of foresaid. Act of Feb. 10, 1807.

By the direction of the President, Albert Gallatin, Secretary of the Treasury, addressed a circular-letter to American men of science, requesting their opinion as to the character of the plan to be adopted.

In the circular of the Secretary of the Treasury, the work to be performed was defined as consisting of three distinct parts, as follows :

"1. The ascertainment by a series of Astronomical observations of the position of a few remarkable points on the coast, and some of the Light-Houses placed on the principal capes, or at the entrance of the principal harbors, appear to be the most eligible places for that purpose as being objects

particularly interesting to navigators, visible at a great distance, and generally erected on spots on which similar buildings will be continued so long as navigation exists."

"2. A trigometrical survey of the coast between these points of which the position shall have been astronomically ascertained; in the execution of which survey, the position of every distinguishable permanent object should be carefully designated; and temporary beacons be erected at proper distances on those parts of the coast on which such objects are really to be found."

"3. A nautical survey of the shoals and soundings of the coast of which the trigometrical survey of the coast itself, and the ascertained position of the Light-Houses, and other distinguishable objects, would be the basis; and which would therefore depend but little on any Astronomical observations made on board the vessels employed on the part of the work."

This circular-letter was submitted to thirteen scientific men, and in response thirteen plans were received at the Treasury Department. A commission, composed of the experts from whom answers had been received, was formed. They met at Professor Patterson's, in Philadelphia, and the plan which they finally selected was then proposed by Ferdinand Rodolph Hassler, at that time, and for several years thereafter, Professor in the Military Academy at West Point.

Nothing was done to secure definitely the execution of this plan until 1811, when Hassler was sent to Europe to procure the necessary instruments and standards of measure for the proposed work. He was detained as an alien in London during the entire war with England, and until 1815, when he returned to the United States, having, as a matter of course, far exceeded the limits of his appropriation, with a large claim against the government for indemnification.¹

¹ An interesting reminiscence of his career in this period is contained in the diary of John Quincy Adams for July, 1815, when there is described an interview by himself, with Mr. Gallatin, at that time United States Minister in London, in which the latter spoke of Hassler, who had just left them.

"That is a man of great ability. He was sent by the Government to England, to procure the instruments for the general survey of our coast, but he has outrun his time and his funds, and his instruments cost £800 sterling more than was appropriated for them; and he is embarrassed now about getting back to America. I have engaged the Messrs. Baring to advance the money for the instruments, and he is to go for his own expenses upon his own credit. He has procured an excellent set of instruments."—Adams's "*Memoirs*," iii., p. 248.

The circulars elicited by Hassler's plan are printed in the *Transactions of the American Philosophical Society* for 1812, vol. ii.

I have been unable to ascertain the exact date of the appointment of Hassler, as the Superintendent of the Coast Survey, although it was thoroughly understood at the time of the acceptance of his plan in 1807, that it was to be carried out under his direction.

It was not until August, 1816, that the contract was signed with the government which authorized Hassler to proceed with his work. In 1817 a beginning was made in the bay and harbor of New York, but Congress failed to provide for its continuance, and it was soon suspended, and in 1818, before the superintendent had the opportunity to publish a report upon the results of his last year's labor, Congress, on the plea "that the little progress hitherto made in the work had caused general dissatisfaction," ordered its discontinuance by repealing the law under which the superintendent had been appointed, and providing that no one should be employed in the survey of the coast except officers of the army and navy. This was practically a discontinuance of the work, because there was no one in America but Hassler who was capable of directing it.

Immediately after being thus legislated out of office, he was appointed one of the astronomers to represent the United States in the settlement of the Canadian boundary.

From 1819 to 1832, attempts were made at various times by the Navy Department to survey several portions of the coast. A few detached surveys were made, but no general systematic work was attempted, and the result was not on the whole creditable. In 1828 the Honorable S. L. Southard of New Jersey, at that time Secretary of the Navy, in response to resolutions of inquiry from the House of Representatives, admitted that the charts produced by the navy were unreliable and unnecessarily expensive, and declaring also that the plan which had been employed was desultory and unproductive, recommended that the provisions of the law of 1807 should be resumed.

In 1832, Congress passed an act reorganizing the surveys on the old plan.

An act to carry into effect the act to provide for a survey of the coast of the United States.

Section 1. Be it enacted, etc., that for carrying into effect the act entitled, "An act to provide for surveying the coast of the United States," approved on the 10th day of February, 1807, there shall be, and hereby is, appropriated a sum not exceeding \$20,000, to be paid out of any money in the Treasury not otherwise appropriated; and the said act is hereby revised, and shall be to provide for the survey of the coast of Florida, in the same manner as if the same had been named direct.

Section 2. That the President of the United States be, and he is hereby, authorized, in and about the execution of the said act, to use all maps, charts, instruments, and apparatus which now, or hereafter may, belong to the United States, and employ all persons of the land and naval service of the United States, such as astronomers, and other persons as he shall think proper.

Hassler was now again appointed Superintendent of the Coast Survey, and held his position until his death in 1843, the work for a short time, at first, being assigned to the Treasury Department, and in 1834 transferred to the Navy Department, and in 1836 again re-transferred to the Treasury, where it has since remained, its status being finally definitely settled by act of Congress passed in 1843, shortly before the appointment of Alexander Dallas Bache, as the successor of the first superintendent of the survey.

At the time of Hassler's death the survey had been extended from New York, where it was begun, eastward to Point Judith, and southward to Cape Henlopen.

It should be mentioned that in 1825, during the period of the suspension of activity, Hassler presented to the American Philosophical Society a memoir on the subject of the survey, which contained a full account of the plan which he had adopted, a description of his instruments, and a history of what had been accomplished up to 1817. "This memoir," wrote Professor Henry in 1845, "was received with much favor by competent judges abroad, and the commendation bestowed upon it was of no little importance in the wakening of sentiments of national pride, which had considerable influence in assisting the passage of the act authorizing the renewal of the survey in 1832."

With the appointment of Bache as Superintendent in 1843, the survey entered upon a new period of prosperity, the discussion of which is not within the province of this paper, and it seems appropriate to close this notice of the origin and early history of the organization by quoting from the first report of his successor an estimate of the value of Hassler's services.

"The Coast Survey," wrote Bache, "owes its present form and perhaps its existence to the zeal and scientific activity of the late Superintendent, who devoted the energy of his life to it; and who, but for its interruption at a period when he was in the prime of manhood, and its suspension for nearly fifteen years, might have seen its completion. The difficult task of creating resources of practical science for carrying on such a work upon a suitable scale, required no common zeal and perseverance for its accomplishment, especially at a time when our country was far from having attained its present position of scientific acquirement, and when public opinion was hardly sufficiently enlightened to see the full advantage of clearness in executing the work. For his successful struggle against great difficulties his adopted country will do honor to his memory as pioneer of a useful national undertaking."¹

The history of the Coast Survey under the successive superintendentships of Bache [1843-1867], Peirce [1867-1874], Patterson [1874-1881], and Hilgard [1881-1887], would make a volume in itself. Under its present director, Professor Mendenhall, it is growing into renewed vigor and efficiency.

The Coast Survey was the last of the great scientific enterprises begun in Jefferson's administration. If the "Sage of Monticello" were now living, what delight he would feel in the manifold scientific activities of the nation. The enlightened policy of our government in regard to scientific and educational institutions, is

¹ Report of Alexander Dallas Bache, Superintendent of the Coast Survey.

doubtless to a considerable degree due to his abiding influence.

"Nowhere in all the long course of Mr. Jefferson's great career," writes Henry Adams, "did he appear to better advantage than when, in his message of 1806, he held out to the country and the world that view of his ultimate hopes and aspirations for national development, which was, as he then trusted, to be his last bequest to mankind. Having now reached the moment when he must formally announce to Congress that the great end of relieving the nation from debt was at length within reach, and with it the duty of establishing true republican government was fulfilled, he paused to ask what use was to be made of the splendid future thus displayed before them. Should they do away with the taxes? Should they apply them to the building up of armies and navies? Both relief from taxation and the means of defence might be sufficiently obtained without exhausting their resources, and still the great interests of humanity might be secured. These great interests were economical and moral; to supply the one, a system of internal improvement should be created commensurate with the magnitude of the country; 'by these operations new channels of communication will be opened between the States, the lines of separation will disappear, their interests will be identified, and their union cemented by new and indissoluble ties.' To provide for the other, the higher education should be placed among the objects of public care; 'a public institution can alone supply those sciences which, though rarely called for, are yet necessary to complete the circle, all the parts of which contribute to the improvement of the country and some of them to its preservation.' A national university and a national system of internal improvement were an essential part, and indeed the realization and fruit, of the republican theories which Mr. Jefferson and his associates put in practice as their ideal of government."¹

¹ Adams's "Life of Gallatin," pp. 349, 350. Henry Adams in this admirable biography has shown that Gallatin was one of Jefferson's strongest supporters in plans for the public enlightenment, and that he had an ambition of his own for the education of all citizens, without distinction of classes.

"I had another favorite object in view," Gallatin writes, "in which I have failed. My wish was to devote what may remain of life to the establishment, in this immense and fast-growing city (New York), of a general system of rational and practical education fitted for all and gratuitously opened to all. For it appeared to me impossible to preserve our democratic institutions and the right of universal suffrage unless we could raise the standard of general education and the mind of the laboring classes nearer to a level with those born under favorable circumstances. I became accordingly the president of the council of a new university, originally established on the most liberal principles. But finding that the object was no longer the same, and that their object, though laudable, was special and quite distinct from mine, I resigned at the end of one year rather than to struggle, probably in vain, for what was near unattainable."—*Op. cit.*, p. 648.

Madison's administration, which began in 1809, though friendly to science, was not characterized by any remarkable advances (except that the Coast Survey was actually organized for work under Hassler, after his return from Europe in 1816). The war of 1812 and the unsettled state of public affairs were not propitious to the growth of learned institutions.

Monroe became chief magistrate in 1817. He, like Madison, was a friend and follower of Jefferson, and in the atmosphere of national prosperity scientific work began to prosper, and there was a great accession of popular interest, and State geological surveys began to come into existence. Schoolcraft and Long led government expeditions into the West; the American Geological Society and the *American Journal of Science* were founded.

The city of Washington began to have intellectual interests, and public-spirited men organized the Columbian Institute and the Columbian University.

Monroe was not actually acquainted with science, but was in hearty sympathy with it. When he visited New York, in 1817, he visited the New York Institution, and was received as an honorary member of the Literary and Philosophical Society, and in his reply to the address of Governor Clinton, its president, he remarked that "the honor, glory, and prosperity of the country were intimately connected with its literature and science, and that the promotion of knowledge would always be an object of his attention and solicitude."

The most important new enterprise was in the direction of organizing a national meteorological service.

The first move was made by Josiah Meigs, who was in 1814 appointed Commissioner of the General Land Office. With the exception of Franklin,¹ he was perhaps the earliest

¹ See Benjamin Franklin's "Meteorological Imaginations and Conjectures," in the Memoirs of the Literary and Philosophical Society of Mansfield.

Communications made at Passy (France), in 1784, and reported in the *Pennsylvania Packet* (in Congressional Library) of July 18, 1786.

scientific meteorologist in America, having, while living in the Bermudas from 1789 to 1794, made a series of observations which he communicated to the Royal Society.¹

In 1817, or before he began to advocate Congressional action for the establishment of meteorological registers in connection with the Land Office, writing to Dr. Daniel Drake in 1817, he said:

"If my plan be adopted, and the Registers be furnished with the requisite instruments for Temperature, Pressure, Rain, Wind, &c. . . . we may, in the course of a year, know more than we shall be able to know on any other plan." P. 82. "Without some system of this kind our country may be occupied for ages, and we the people of the United States be as ignorant on this subject as the *Kickapoos* now are, who have occupied it for ages past." P. 83.

In 1817 he also issued a circular to the Registrars of the Land Offices of the several States, calling upon them to take regularly certain observations and make monthly official reports upon all meteorological phenomena.

In 1819 a co-operative movement was begun under the direction of Dr. Joseph Lovell, Surgeon-General of the Army, in connection with the medical officers at the principal military posts, by whom reports were made at the end of each month upon the temperature, pressure, and moisture of the air, the amount of rain, the direction and force of the wind, the appearance of the sky, and other phenomena.

The Land-Office circular was a remarkable one, and led to the extensive system of Patent-Office observations, the results of which, published in connection with those of the War Department and the Smithsonian in 1859, formed the foundation of scientific meteorology in the United States.

In 1839 a most admirable paper by the French geologist, I. N. Nicollet, an "Essay on Meteorological Observations," was published under the direction of the Bureau of Topographical Engineering. Some years later the lake system of meteorological observations was established by the Engineer Department, under the direction of Captain (afterwards

¹ "Life of Josiah Meigs," p. 27.

General) George G. Meade. This included a line of stations extending from the western part of Lake Superior to the eastern part of Lake Ontario.

In 1835 a system of observations had been established under the direction of the Board of Regents of the University of the State of New York, the points of observation being at the academies of the State, and in 1837 the Legislature of Pennsylvania made an appropriation of \$4,000 for instruments for use in meteorological observations, which were continued until about 1847. Those of New York were kept up until 1865 or later.

In the meantime, the idea of the pre-announcement of storms by telegraph was suggested in 1847 by W. C. Redfield, the discoverer of the law of storms, while Lieutenant Maury from 1851 onward, and especially at the International Meteorological Conference (held at his instance in Belgium in 1853) was promoting the establishment of a system of agricultural meteorology for farmers, and of daily weather reports by telegraph.¹

In February, 1855, Leverrier obtained the sanction of the Emperor of France for the creation of an extensive organization for the purpose of distributing weather intelligence, though it was not till 1860 that he felt justified in making his work international.² In 1861 and in 1862 a similar organization was begun in England, under Admiral Fitzroy, which was extended a little later to India.

In the meantime all the essential features for the prediction of meteorological phenomena were in existence in the Smithsonian Institution as early as 1856, having grown up as the result of an extensive series of tabulations of observations recorded by volunteer observers in all parts of the country.

The following historical notes on weather telegraphy, published by Professor Cleveland Abbe in 1871,³ give a summary of the progress of this work:

¹ "Maury's Life," p. 77. ² Scott, "Storm Warnings," London, 1883.

³ *American Journal of Science*, July, 1871.

However frequently the idea may have been suggested of utilizing our knowledge by the employment of the electric telegraph, it is to Professor Henry and his assistants in the Smithsonian Institution that the credit is due of having first actually realized this suggestion.

The practical utilization of the results of scientific study is well known to have been in general greatly furthered by the labors of this noble institution, and from the very beginning Professor Henry has successfully advocated the feasibility of telegraphic storm warnings. The agitation of this subject in the United States during the years 1830-1855 may be safely presumed to have stimulated the subsequent action of the European meteorologists. It will be interesting to trace the gradual realization of the earlier suggestions of Redfield and Loomis in the following extracts from the annual Smithsonian Reports of the respective years :

1847. "The extended lines of telegraph will furnish a ready means of warning the more northern and eastern observers to be on the watch for the first appearance of an advancing storm."

1848. "As a part of the system of meteorology, it is proposed to employ, as far as our funds will permit, the magnetic telegraph in the investigation of atmospherical phenomena. . . . The advantage to agriculture and commerce to be derived from a knowledge of the approach of a storm by means of the telegraph has been frequently referred to of late in the public journals ; and this we think is a subject deserving the attention of the Government."

1849. "Successful applications have been made to the presidents of a number of telegraph lines to allow us at a certain period of the day the use of the wires for the transmission of meteorological intelligence. . . . As soon as they [certain instructions, etc.] are completed, the transmission of observations will commence." (It was contemplated to constitute the telegraph operators the observers.)

1850. "This map [an outline wall-map] is intended to be used for presenting the successive phases of the sky over the whole country at different points of time, as far as reported."

1851. "Since the date of the last report the system particularly intended to investigate the nature of American storms immediately under the care of the institution, has been continued and improved."

The system of weather reports thus inaugurated continued in regular operation until 1861, when the disturbed condition of the country rendered impossible its further continuance. Meanwhile, however, the study of these daily morning reports had led to such a knowledge of the progress of our storms that in the Report for 1857 Professor Henry writes :

1857. "We are indebted to the National Telegraph Line for a series of observations from New Orleans to New York and as far westward as Cincinnati, which have been published in the *Evening Star* of this city.

"We hope in the course of another year to make such an arrangement with the telegraph lines as to be able to give warnings on the eastern coast of the approach of storms, since the investigations which have been made at the institution fully indicate the fact that as a general rule the storms of our latitude pursue a definite course."

It would seem, therefore, that nothing but the disturbances of the late war prevented our having had, ten years ago, a valuable system of practical storm warnings. Even before peace had been proclaimed, Professor Henry sought to revive the systematic daily weather reports, and in August, 1864, at the meeting of the North American Telegraph Association (see their published report of proceeding) a paper was presented by Professor Baird, on behalf of the Smithsonian Institution, requesting the privilege of the use of the telegraph lines, and more especially in order to enable Professor Henry "to resume and extend the weather bulletin, and to give warning of important atmospheric changes to our seaboard." In response to this communication it was resolved, "That this association recommend—to pass free of charge—brief meteorological reports for the use and benefit of the institution."

On the communication of this generous response preparations were at once made for the laborious undertaking, and the inauguration of the enterprise was fixed for the year 1865. In January of that year, however, occurred the disastrous fire which so seriously embarrassed the labors of the Smithsonian Institution for several following years. It became necessary to indefinitely postpone this meteorological work, which, indeed, had through its whole history been carried on with most limited financial means, and was quite dependent upon the liberal co-operation of the different telegraph companies.

It will thus be seen that without material aid from the government, but through the enlightened policy of the telegraph companies, and with the assistance of the munificent bequest of James Smithson. "for the increase and diffusion of knowledge," the Smithsonian Institution, first in the world, organized a comprehensive system of telegraphic meteorology, and has thus given, first to Europe and Asia, and now to the United States, the most beneficent national application of modern science, the storm warnings.

In the Report of the Smithsonian Institution for 1858 it is stated:

"An object of much interest at the Smithsonian building is the daily exhibition on a large map of the condition of the weather over a considerable portion of the United States. The reports are received about ten o'clock in the morning, and the changes are made on the map by temporarily attaching to the several stations pieces of card of different colors to note the different conditions of the weather, and the clearness, cloudiness, rain, or snow. This matter is not only of interest to visitors in exhibiting the kind of weather which their friends at a distance are experiencing, but is also of importance in determining at a glance the probable changes which may soon be expected."¹

In a still earlier report Professor Henry said:

"We are indebted to the National Telegraph Line for a series of observations from New Orleans to New York, and as far westward as Cincinnati, Ohio, which

¹ "13th Annual Report of the Secretary of the Smithsonian Institution," p. 32. (1858.)

have been published in the *Evening Star*, of this city. These reports have excited much interest, and could they be extended further north and more generally to the west, they would furnish important observations as to the approach of storms. We hope in the course of another year to make such an arrangement with the telegraph lines as to be able to give warning on the eastern coast of the approach of storms, since the investigations which have been made at the Institution fully indicate the fact that, as a general rule, the storms of our latitude pursue a definite course."¹

In 1868, Cleveland Abbe, then director of the Cincinnati Observatory, revived the Smithsonian idea of meteorological forecasts, and suggested to the Cincinnati Chamber of Commerce that Cincinnati should be made the headquarters of meteorological observation for the United States, "for the purpose of collecting and comparing telegraphic weather reports from all parts of the land and making deductions therefrom." His proposals were favorably received, and he began, September 1, 1869, to issue the "Weather Bulletin of the Cincinnati Observatory," which he continued until, in January, 1871, he was summoned to Washington to assist in organizing the national meteorological service, with which he has ever since been identified.

The Smithsonian meteorological system continued its functions until it was finally consigned to the custody of the chief signal officer of the army. Like all the efforts of this institution, this work was in the direction of supplementing and harmonizing the work of all others, and attention was especially devoted to preparing and distributing blank forms in this direction, calculating and publishing extensive papers for systematizing observations, introducing standard instruments, collecting all public documents, printed matter, and manuscript records bearing on the meteorology of the American continent, submitting these materials for scientific discussion, and publishing their results. The Smithsonian work was, during its whole existence, under the immediate personal direction of Professor Henry, assisted by Professor Arnold Guyot, who, in 1850,

¹ "12th Annual Report of the Secretary of the Smithsonian Institution, 1857," p. 26. Also, "20th Annual Report of the Secretary of the Smithsonian Institution, 1855," pp. 54-57.

prepared and published an exhaustive series of directions for meteorological observations, intended for the first-class observers co-operating with the Smithsonian Institution.

The seeds planted by the army in 1819 began to bear perfect fruit fifty years later, when by act of Congress, in 1870, the Secretary of War was authorized to carry into effect a scheme for "giving notice by telegraph and signals of the approach and force of storms," and the organization of a meteorological bureau adequate to the investigation of American storms, and their pre-announcement along the northern lakes and the sea-coast was, under the auspices of the War Department, trusted to the chief signal officer of the army, Brigadier-General Albert J. Myer, and a division, created in his office, was designated as the "Division of Telegrams and Reports for the Benefit of Commerce."

By a subsequent act of Congress, approved June 10, 1872, the Signal Service was charged with the duty of providing such stations, signals, and reports as might be found necessary for extending its research in the interest of agriculture. In 1873, the work of the bureau of the division having been eminently successful, and its successes having been recognized abroad as well as in this country, Congress, by a further act, authorized the establishment of signal-service stations at the light-houses and life-saving stations on the lake sea-coasts, and made provision for connecting them with telegraph lines or cables, "to be constructed, maintained, and worked under the direction of a chief signal officer of the army, or the Secretary of War and the Secretary of the Treasury," and in this year also was begun the publication of a *Monthly Weather Review*, summarizing in a popular way all its data showing the result of its investigations, as well as presenting these in graphic weather charts.

In 1874 the entire system of Smithsonian weather observation in all parts of the United States was transferred by Professor Henry to the Signal Service. A few months previously, at the proposal of the chief signal officer, in the International Congress of Meteorologists convened at Vienna, the system of world-wide co-operative simultaneous weather observa-

tions, since then so extensively developed, was inaugurated, and began to contribute its data to the signal-office records. It is unnecessary to trace further the history of the beginning of the meteorological work of the Signal Service, but I doubt not that every one at all familiar with its subsequent history, under the leadership of Generals Hazen and Greely, will agree with the opinion of Judge Daly, the president of the American Geographical Society, when he said that "nothing in the nature of scientific investigation by the national government has proved so acceptable to the people, or has been so productive in so short a time of such important results, as the establishment of the Signal-Service Bureau."¹

The sixth President, John Quincy Adams, a man of culture broad and deep, found the presidency of the American Academy of Arts and Sciences so congenial to his tastes and sympathies that he did not hesitate to say that he prized it more highly than the chief magistracy of the nation. He considered his most important achievement to be the "Report on Weights and Measures," prepared for Congress in 1818, and was justly proud of it, for it was a very admirable piece of scientific work, and is still considered the most important treatise on the subject ever written.

John Quincy Adams revived Washington's national-university project, and made battle valiantly for an astronomical observatory.

In his first message to Congress afterward, he said :

"Among the first, perhaps the very first, instrument for the improvement of the condition of men is knowledge ; and to the acquisition of much of the knowledge adapted to the wants, the comforts, and enjoyments of human life, public institutions and seminaries of learning are essential. So convinced of this was the first of my predecessors in this office, now first in the memory, as living he was first in the hearts, of our country, that once and again, in his addresses to the Congresses with whom he co-operated in the public service, he earnestly recommended the establishment of seminaries of learning, to prepare for all the emergencies of peace and war, a National University and a Military

¹ 1883, History of the United States Signal Service, with catalogue of its exhibit at the International Fisheries Exhibition. London, 1873 ; Washington City, 1883 ; octavo ; pp. 1-28.

Academy. With respect to the latter, had he lived to the present day, in turning his eyes to the Institution at West Point, he would have enjoyed the gratification of his most earnest wishes. But in surveying the city which has been honored with his name, he would have seen the spot of earth which he had destined and bequeathed to the use and benefit of his country as the site for a University, still bare and barren."¹

And again :

"Connected with the establishment of a university, or separate from it, might be undertaken the erection of an astronomical observatory, with provision for the support of an astronomer, to be in constant attendance of observance upon the phenomena of the heavens ; and for the periodical publications of his observations. It is with no feeling of pride, as an American, that the remark may be made that, on the comparatively small territorial surface of Europe, there are existing upward of one hundred and thirty of these light-houses of the skies ; while throughout the whole American hemisphere there is but one. If we reflect a moment upon the discoveries which, in the last four centuries, have been made in the physical constitution of the universe by the means of these buildings, and of observers stationed in them, shall we doubt of their usefulness to every nation ? And while scarcely a year passed over our heads without bringing some new astronomical discovery to light, which we must fain receive

¹ John Quincy Adams, in his diary for November, 1825, describes an interview with his Cabinet, and the discussion which followed the reading of his message before it was finally revised for sending to Congress.

"Mr. Clay wished to have the recommendations of a National University . . . struck out . . . The University, Mr. Clay said, was entirely hopeless, and he thought there was something in the constitutional objection to it. . . . I concurred entirely in the opinion that no projects absolutely impracticable ought to be recommended ; but I would look to a practicability of a longer reign than a simple session of Congress. General Washington had recommended the Military Academy more than ten years before it was obtained. The plant may come late, though the seed should be sown early. And I had not recommended a University. I had referred to Washington's recommendations, and observed they had not been carried into effect."

Such opinions as these of Mr. Clay were evidently very much at variance with those of John Quincy Adams and of his illustrious father, whose action in the constitutional convention of Massachusetts has already been referred to, and at variance as well, it would seem, with the opinion of the early Republicans, as with those of the Federalists. The views of Washington and Madison, as well as those of Jefferson and Barlow, on these subjects have already been referred to.

Mr. Adams, in commenting upon an address delivered by Edward Everett before the Columbian Institute, January 16, 1830, remarks :

"I regretted to hear a seeming admission that the powers of giving encouragement to literature and science were greater at least in State governments than in that of the Union." Vol. vii., p. 171.

at second-hand from Europe, are we not cutting ourselves off from the means of returning light for light, while we have neither observatory nor observer upon our half of the globe, and the earth revolves in perpetual darkness to our unsearching eyes?"

This appeal was received with shouts of ridicule; and the proposal "to establish a light-house in the skies" became a common by-word which has scarcely yet ceased to be familiar. So strong was public feeling that, in the year 1832, in reviving an act for the continuance of the survey of the coast, Congress made a proviso, that "*nothing in the act should be construed to authorize the construction or maintenance of a permanent astronomical observatory.*"

Nothing daunted, Mr. Adams continued the struggle, and while a member of the House of Representatives, after his presidential term had expired, he battled for the observatory continually and furiously. An oration delivered by him in Cincinnati, in 1843, closed with these words:

"Is there one tower erected to enable the keen-eyed observer of the heavenly vault to watch from night to night, through the circling year, the movements of the starry heavens and their unnumbered worlds? Look around you, look from the St. John to the Sabine, look from the mouth of the Neversink to the mouth of the Columbia, and you will find not one! or if one, not of our erection."

A correspondent of the London *Athenæum*, writing from Boston in May, 1840, spoke at length of the dearth of observatories in the United States, and of the efforts of John Quincy Adams to form a national astronomical establishment in connection with the Smithson bequest. The letter is of great interest as showing the state of opinion on scientific matters in America just half a century ago.

BOSTON, May, 1840.

One of the prominent subjects of discussion among our *savans* is the establishment of *Observatories* of a character suitable to our standing as a civilized nation, and still more to our exigencies as a practical, and especially as a commercial community. I verily believe that the yearly damage and destruction along our coast, for want of the securities which such institutions would supply, out-balances, beyond comparison, all it would cost to establish and maintain them in every principal city of the land. It is partly a sort of electioneering economy which leaves things thus, and which has hitherto refused or neglected

to fit out Exploring Expeditions ; to accumulate national treasures of art and science, and facilities for their prosecution ; and generally to pursue a system of "in-breeding and cherishing," as Milton has it, "in a great people, the seeds of virtue and public civility" ; excepting always what is done for the diffusion of elementary popular education. This education, to be sure, and this diffusion of it, we are taught to regard as necessities in our moral and social being—the "staff of public life" among us. And we are right. It is so. But there are many other things which we have not been taught to appreciate as they deserve, and the value of which we have gradually to grope our way to. Their day, however, will come : though it cannot be expected that either a government or a people so youthful, so hurried, so fluctuating, can reach at once to the graces and the "fair humanities" of the old world. Remember that the "United States" are only some half-century old ; and remember what we have been obliged to do and to suffer meanwhile, and under what circumstances. But, as I said before, the time is coming, if not come, when the heart of the nation shall acknowledge what is the high duty and destiny of a country like this ; and then, I need not tell you, all is accomplished. Congress and the government must always represent the general as well as the political character of the nation. It will be refined, scientific, public-spirited, or otherwise, as are the people. At this moment, as at all times, the representative and the represented, bear this relation to each other as intimately as might be expected from the nature of our institutions ; and hence, from the signs which have appeared in the legislative bodies, I derive hope, and feel authorized to say what I have said of the advance, throughout our community, of what may be called the graceful and genial system of civilization, as distinguished from the practical and hard. This subject of observatories is quite in point. True, nothing has yet been done, but then a good deal has been said ; and that is much : it is, in fact, doing much, in a case like this. It was something for Congress to bear being told what they had neglected, and patiently to discuss the subject.

The principal agent in bringing the subject forward has been Ex-President Adams, who, as you may be aware, is still an M.C., at the age of between seventy and eighty, and one of the halest and hardiest men in that body. His spirit is equal to his iron constitution. He spares himself no labour. So well is this understood, that it has been of late rather a practice to select the old gentleman for special burthens ; and there are many matters of legislative action, which he really understands better, or knows better at least how to explore and determine, than any member of the House. Thus the Observatory business came upon him, at least indirectly ; for, to some extent, he brought it on himself. You are, no doubt, familiar with the history of the great Smithsonian Bequest. When that business came before Congress, and especially as it was not a party one, all eyes were turned on Mr. Adams, and he was appointed Chairman of the Committee. In this capacity he has made sundry Reports ; the last and ablest reviews the whole subject. In this he labours to show what general appropriation ought to be made of the fund—for that is not yet determined—and then to sustain a special recommendation, which is, to devote the income for about ten years to an Observatory, to be founded on national land, at Washington, "adapted to the most effective and continual observations of the phenomena

of the heavens, and to be provided with the necessary, best, and most perfect instruments and books for the periodical publication of the said observations, and for the annual composition and publication of a *Nautical Almanac*." The details of the plan may be omitted. Many, however, of the statistics connected with them, are new to us here, and of interest, including a Report on the British establishments, furnished, on request, by the Astronomer Airy. To a greater extent these may be familiar to English readers, but perhaps not wholly so. I hope they do not know, for example, how much we observe, as compared with other nations, the caustic strictures and lectures of Mr. Adams, who really gives us no quarter, being resolved not to spoil the child by sparing the rod, but rather to provoke us to find a remedy for the evils he describes. You yourself adverted, not long since, to the state of things among us, but only in general terms. The facts are these: They have a small observatory in process of erection at Tuscaloosa, Alabama, for the use of the university in that place. Professor Hopkins, of Williams College, Massachusetts, has a little establishment of the sort, and this is about all in that state,—all in New England! The only other establishment in the United States, known to me, is that in the Western Reserve College, Ohio, under the charge of Professor Loomis. Nothing of the kind at our national seat of government, or anywhere near it! Even Harvard University, "with all its antiquity, revenue, science, and renown," has thus far failed, though it appears that they are breaking ground at Cambridge; a house or houses having been purchased and fitted up, and one of our "savans" is already engaged in a series of magnetic and other observations. Now, how stands the case on your side the water? Why, in the British Islands alone, there are observatories at the Universities of Cambridge and Oxford—at Edinburgh and Glasgow, in Scotland—and at Dublin and Armagh, in Ireland—all receiving some patronage from the government—to say nothing of an observatory at the Cape of Good Hope; or of the establishments on the various remote and widely separated dependencies of the British empire, including Van Diemen's Land, for the furnishing of which, we understand arrangements have been made, in connection with Captain Ross's expedition. In France, I believe, the provision is not less ample. On this part of the subject Mr. Adams merely remarks, that the history of the Royal Observatory of that country would show the benefits conferred on mankind by the slightest notice bestowed on the rulers on the pursuit of knowledge: and that "the names of the four Cassinis would range in honorable distinction by the side of Flamsteed, Bradley, and Maskelyne."

Special reference is of course made to Greenwich, and Mr. Adams takes much pains to show how much that institution has done for science and for man. After recapitulating how to preserving observations we are indebted for a fixed standard for the measurement of time,—how, by the same science, man has acquired, so far as he possesses it, a standard for the measurement of space, he observes, that the minutest of these observations contribute to the "increase and diffusion of knowledge" (the expressed object in Smithson's bequest). As to the more brilliant, we are reminded of an observation of Voltaire, that if the whole human race could be assembled from the creation of man to this time, in gradation of genius, Isaac Newton would stand at their head; and the discov-

eries of Newton were the results of calculations, founded on the observations of others—of Copernicus, Tycho Brahe, Kepler, and Flamsteed. Greenwich has been considered rather an expensive establishment (among us), but Mr. Adams shows that, though costly, it has not been profitless.

Not to enter further into details of European countries, it appears that there are about one hundred and twenty observatories in Continental Europe; and that the most magnificent of them all has been lately founded by the Czar in the vicinity of his capital: an enterprise sufficiently glorious, Mr. Adams observes, for the sovereign of such an empire; but the merit of which is enhanced by the fact of its being undertaken and accomplished in such a latitude and climate:—"a region so near the pole, that it offers to the inspection of the human eye only a scanty portion of the northern hemisphere, with an atmosphere so chilled with cold and obscured with vapors, that it yields scarcely sixty days in the year when observation of the heavenly bodies is practicable." This fact, it must be allowed, is rather an aggravation, or ought to be, to us republicans, some among whom affect to be special despisers of the bigoted Nicholas, and all his works. It seems, too, that Mehemet Ali has come forward as the patron of philosophical inquiry.

Thus matters stand at present, and Mr. Adams strongly urges prompt, practical action; and this scheme, with some modifications, and after our customary delays and discussions (in Congress) will be carried into execution, at least to a respectable extent. I am the more inclined to the opinion as it has been made clear in the progress of discussion that the establishments referred to need not be so enormously expensive as they generally are. In this matter we have been misled and discouraged by your example, among others. We found that Cambridge Observatory cost 20,000*£*, and that, among the instruments, the price of the mural circle alone was over 1,000*£*, to say nothing of an equatorial telescope at 750*£*, or a transit instrument 600*£*, and that as to Greenwich, the annual expenses, including salaries, repairs, and printing, exceeded 3,000*£*. Now, this may be "sport for you," but it knocked our calculations on the head. Our ideas are not yet enlarged to that extreme point. To be sure, we can spend money for Florida wars; nay, for better things—for internal improvements—for bridges over the Ohio River (St. Louis), or for market-houses and meeting-houses of most liberal dimensions—for whatever, in a word, is practical—as we understand it—and especially so much of it as private enterprise can execute without calling in government aid:—but ask for the adornments and muniments of art and science, in the ornamental or even in the scholar-like way, and it must be acknowledged the "sovereign people" move slow; they button their breeches' pockets and begin to "calculate." As to the Observatories, however, the case is better, for we find that much can be done at small expense. An establishment of the merely useful kind, may be set up for a trifle. Not that Mr. Adams proposes to establish the National Observatory on such a scale. On the contrary, he thinks the Smithsonian fund should be devoted to it for the present, and that not less than ten years of the income will be required. A more explicit estimate is also added, but it will be sufficient to observe that it comprises, besides a salary of \$3,600 for the astronomer, funds for the compensation of four assistants, at \$1,500 each, and two laborers, each at \$600; for the

purchase and procurement of instruments, \$30,000 ; of which \$20,000 might be applied for an assortment of the best instruments to be procured, and \$10,000 for a fund, from the interest of which other instruments may be from time to time procured, and for repairs ; for the library, \$30,000 ; being \$10,000 for first supply, and \$20,000 for a fund for an income of \$12,000 a year ; and finally \$30,000 for a fund, from the income of which \$1,800 a year, shall go to defray the expenses of the yearly publication of the observation and of a Nautical Almanac.

It was the idea of Mr. Adams, in his later days, that the Smithsonian bequest, or, at least, its income for ten years, should be applied to the foundation of a national observatory and the publication of the "Nautical Almanac," and he only abandoned it when an observatory had actually been established under the Navy Department, in connection with the Department of Charts and Instruments.

The establishment of an observatory had, indeed, been prominent in the minds of Washington and Jefferson, and was definitely proposed in Barlow's plan for a national institution, as well as in the project for a coast survey, submitted in 1837, in which it was proposed that there should be two observatories, formed at a fixed point, around which the survey, and particularly the nautical part of it, should be referred, their situation preferably to be in the State of Maine or Lower Louisiana, since from them every celestial object observable, from the tropics to the arctic circle, and within about twenty degrees of longitude, could be observed. Still, however, since various considerations might occasion the desire of placing one of these observatories in the city of Washington, just as observatories had been placed in the principal capitals of Europe, as a national object of scientific ornament as well as a means for nourishing science in general, Hassler conceded that it might there be placed, since it would then be the proper place for the deposit of the standards of weights and measures, which also makes a special part the collection of instruments. James Monroe, when Secretary of State in 1812, strongly urged upon Congress the establishment of an observatory, urging, first, the necessity of establishing a first meridian for the continent, and, in the second place, the fact that every enlightened

nation had already established such an institution of learning. The immediate occasion for the intervention of the Secretary of State was the memorial of William Lambert, of Virginia, which was presented at various times from 1810 to 1821, and was accompanied by an elaborate report in 1822.

The action of Congress during the Adams administration has been referred to. In 1830, Mr. Vance of North Carolina, Secretary of the Navy under Jackson, strongly urged the establishment of an observatory for general astronomical purposes.

The beginning of the observatory seems to have been actually made on Capitol Hill during Mr. Adams's administration, under instruction of Astronomers Lambert and Elliott, employed by Congress to determine the longitude of Washington. The President, in his diary of 1825, described a visit to Capitol Hill, in company with Colonel Roberdeau, and spoke of witnessing an observation of the passage of the sun over the meridian, made with a small transit instrument. This instrument was very probably the one obtained by Hassler in Europe in 1815, which he never was permitted to use in connection with the coast survey work, and which passed into the hands of Lieutenant Wilkes in 1834, when it was placed in the small observatory, erected at his own expense, about a thousand feet north of the dome of the Capitol.

It was at this establishment, which was known as the "naval depot of instruments," that the five-foot transit was used, mainly for the purpose of reading the naval chronometer. When Wilkes went to sea with his expedition in 1837, Lieutenant James M. Gilliss became superintendent of the depot, and having obtained a 42-inch astronomical telescope, commenced a series of observations on the culmination of the moon and stars. In 1842 the establishment of a permanent depot of charts and instruments was authorized by Congress, and although the establishment of an observatory was not authorized in the bill, every effort was made by Lieutenant Gilliss and others interested in his work to secure

suitable accommodations for astronomical work, and his plans having been approved by President Tyler, work was begun on the Naval Observatory, now known as the National Observatory.

There can be little doubt that the excellence of the work done by Gilliss himself, with his limited opportunities, did much to hasten the establishment of the observatory, and there is in this connection a traditional history. Encke's Comet appeared in 1842, and was promptly observed by him. He read a paper concerning it before the National Institute. Senator Preston, an enthusiastic member of that organization, was present at the meeting. When Gilliss, still a very young man, shortly afterward made a visit to the Senate Committee-room, the Senator remarked to him :

"If you are the one who gave us notice of the comet, I will do all that I can to help you."

A week afterwards a bill passed the Senate and the House without formal discussion. The appropriation was twenty-five thousand dollars, and although it was expressly for the establishment of a depot of charts and instruments, the report of the committee which had secured it was so emphatically in favor of astronomical, meteorological, and magnetic work that the Secretary of the Navy felt justified in assuming that Congress had sanctioned the broadest project for an observatory. Gilliss was at once sent abroad to obtain instruments and plans, while Lieutenant Matthew F. Maury was placed in charge of the depot, and when the observatory was completed in 1844 became its superintendent.

Maury's attitude towards astronomical work has been severely criticised, and, I think, misunderstood. He was, *first of all*, an enthusiastic officer of the navy; *second*, an astronomer, and he deemed it appropriate that the chief effort of the office should be directed toward work which had a direct professional bearing. Although not neglecting astronomy, (for under his direction two volumes of astronomical observations were published) his own attention, and oftentimes that of almost the entire office, was devoted to hydrographic subjects. The work which he had accom-

plished was of the greatest practical importance to navigation, and nothing of a scientific nature up to that time accomplished in America received such universal attention and praise from abroad.

His personal popularity and his influence were very great, and the necessity for the maintenance of a national observatory was not in his day fully appreciated by the public. It is not at all impossible that, indirectly, through his meteorological and hydrographic work, he may have done more for the ultimate and permanent welfare of the National Observatory than could have been possible through exclusive attention to work of a purely astronomical character.

In 1861 Gilliss again became the superintendent, and under his direction the Observatory took rank among the first in the world.

Before leaving the subject of the Observatory, reference should be made to astronomical work almost national in character accomplished in colonial days at Philadelphia under the direction of the American Philosophical Society, by which a committee of thirteen was appointed to make observations upon the Transit of Venus in 1769.

Three temporary observatories were built, one in Philadelphia, one at Norristown, and one at Cape Henlopen. Instruments were imported from England, one of them a reflecting telescope with a Dollond micrometer, purchased in London by Dr. Franklin with money voted by the Assembly of Pennsylvania. The transit was successfully observed and an elaborate report was published.

This enterprise is worthy of mention, because it was the first serious astronomical work ever undertaken in this country. Being under the auspices of the only scientific society then in existence it was in some sense a national effort. Had not the Revolution taken place, it would undoubtedly have resulted in the establishment of a well equipped observatory in this country under the auspices of the home government. Dr. Thomas Ewing, the Provost of the University of Pennsylvania, who seems to have been the first to propose the observations of 1769, and under whose direction they were

carried on, visited London a few years later, and while there made interest with Lord North, the Prime-Minister, and with Mr. Maskelyne, the Astronomer-Royal, for the establishment of an observatory in Philadelphia, and that his efforts gave great promise of success may be shown by the letter here presented, addressed to him by Mr. Maskelyne in 1775.

GREENWICH, 4th August, 1775.

SIR :

I received your late favor, together with your observations of the comet of 1770, and some (copies) of that of 1769, for which I thank you. I shall communicate (them) to the Royal Society as you give me leave. In the present unhappy situation of American affairs, I have not the least idea that anything can be done towards erecting an observatory at Philadelphia, and therefore cannot think it proper for me to take a part in any memorial you may think proper to lay before my Lord North at Present. I do not mean, however, to discourage you from presenting a memorial from yourself. Were an observatory to be erected in that city, I do not know any person there more capable of taking care of it than yourself. Should Lord North do me the honour to ask my opinion about the utility of erecting an observatory at Philadelphia, I should then be enabled to speak out, being always a well wisher to the promotion of science. You did not distinguish whether the times of your observations were apparent or mean time.

I am,

Your most humble servant,

N. MASKELYNE.

To the Rev. Dr. Ewing, at
No. 25, Ludgate Street.

In this connection mention should be made of the extended astronomical work done from 1763 to 1767, by Charles Mason, an assistant of Maskelyne, and Jeremiah Dixon, while surveying the boundary line between Pennsylvania and Maryland, and especially of the successful measurement by them of a meridian of latitude. Mason was a man of high scientific standing, but, though he became a citizen of Philadelphia, where he died in 1787, little is known of him beyond the record of his scientific work. He had been one of the observers of a transit of Venus at the Cape of Good Hope in 1761, and it was no doubt he who inspired the American Philosophical Society to its effort in 1769.

Another event in the Adams administration was the beginning of the National Botanic Garden. The foundation

of such an institution was one of the earliest of the projects for the improvement of the capital. Washington decided that it should be closely connected with the National University, on the site now occupied by the National Observatory, and stipulated that, should this site not be found available, another spot of ground, appropriated on the early maps to a marine hospital, might be substituted. The Columbian Institute, already referred to, had begun the formation of an arboretum as early as 1822, and in 1829 applied unsuccessfully to Congress for an appropriation to reimburse it for its expenditures. There was, however, no definite foundation until 1852, when the numerous living plants which had been brought back by the Wilkes Exploring Expedition in the Pacific, and which had for several years been kept in green-houses adjoining the Patent Office, in which the natural-history collections of the expedition were kept, were removed to the present site of the Botanical Garden on the south side of Pennsylvania Avenue just west of the Capitol. This garden was first under the direction of Mr. W. D. Brackenridge, who had been the horticulturist of the Wilkes Expedition. Mr. Brackenridge was succeeded by Mr. William R. Smith, a pupil of the Kew Botanical Garden, who has since been in charge of the establishment, and through whose industry it has been developed into a most creditable institution, which, it is hoped, may in time have an opportunity to exhibit its merits in a more suitable and less crowded locality.

Under Jackson, from 1829 to 1837, notwithstanding the remarkable commercial prosperity, and an almost equal advance in literature, science did not prosper, and of actual progress there is little to record. The Coast Survey was reorganized under its original superintendent, Hassler, in 1832, and Featherstonehaugh, an English geologist, made, in 1834, a reconnoissance in the elevated region between the Missouri and the Red River.

Van Buren's administration, which began in 1837 and ended in 1841, presents more points of interest, for although

the country was in a state of financial depression, his Cabinet was composed of extremely liberal and public-spirited men. Poinsett as Secretary of War, Kennedy as Secretary of the Navy, and other public men did much to promote science.

The United States Exploring Expedition was sent out under Captain Charles Wilkes, on a voyage of circumnavigation. Although published in an extremely limited edition, the magnificent volumes of its report are among the classics of scientific exploration.

The Wilkes Expedition was the first of a series of naval explorations which have contributed largely to science—Lynch's "Dead Sea Expedition," Gilliss's "Naval Astronomical Expedition" to Chili, Herndon and Gibbons's "Exploration of the Valley of the Amazons," Page's Paraguay Expedition, the "Cruise of the Dolphin," Perry's Japan Expedition, Rogers's North Pacific Exploring Expedition, and the various expeditions made under the Hydrographic Office and the Coast Survey.

In 1840 two important national societies were founded, the National Institution for the Promotion of Science, and the American Society of Geologists and Naturalists,—the one an association with a great membership, scientific and otherwise, including a large number of government officials; the other composed exclusively of professional naturalists.

The purpose of each was the advancement of the scientific interests of the nation, which seemed more likely to receive substantial aid, now that the money bequeathed by Smithson was lying in the Treasury vaults, waiting to be used.

The National Institution under the leadership of Joel R. Poinsett of South Carolina, then Secretary of War, assisted by General J. J. Abert, F. A. Markoe, and others, had a short but brilliant career, which endured until the close of the Tyler administration, and had an important influence on public opinion, bringing about in the minds of the people and of Congress a disposition to make proper use of the Smithsonian bequest, and which also did much to prepare the way for the National Museum. The extensive collections of the National Institution and those of the Wilkes Expedition, and

other government surveys were in time merged with those of the Smithsonian Institution, and having been greatly increased at the close of the Centennial Exposition, began in 1879 to receive substantial support from Congress.

The Society of Geologists was not so prominent at the time, but it has had a longer history, for in 1850 it became the American Association for the Advancement of Science. Although it dated its origin from 1840, it was essentially a revival and continuation of the old American Geological Society, organized September 6, 1819, in the Philosophical Room of Yale College, and in its day a most important body. Its members, following European usage, appended to their names the symbols "M. A. G. S.," and among them were many distinguished men, for at that time almost every one who studied any branch of science, cultivated geology also.

The American Association prepared the way for the National Academy of Sciences, which was established by Congress in 1863, having for its first president, Alexander Dallas Bache, who in his presidential address at the second meeting of the American Association, twelve years before, had pointed out the fact that "an institution of science supplementary to existing ones is much needed to guide public action in reference to scientific matters,"¹ and whose personal influence was very potent in bringing that institution into existence. In advocating before Congress the plan for the National Academy of Sciences, Senator Sumner avowedly followed the lead of Joel Barlow, the projector of the National Institution in 1806.²

¹ "Proceedings of the American Association for the Advancement of Science, 1851," pp. 6 and 48.

² The idea of an Academy of Sciences with unlocalized membership and, like the Royal Society and the French Academy, holding advisory relations with the general government, appears to have been present in the minds of many of the early statesmen. Washington, in his project for a great national university, doubtless intended to include every thing of this kind. Joel Barlow and Thomas Jefferson at the beginning of the century were engaged in correspondence "about learned societies, universities and public instruction." John Adams in a letter to Cutler, dated Quincy, May 1, 1802, referred to a scheme for the establishment of a national academy of arts and sciences, in which Mitchell, of New York, was interested, and which was to come up for discussion at a meeting in that city in the following month. *Life of Manasseh Cutler*, ii., p. 87.

The system of national scientific organizations, thus inaugurated, is still expanding. Within the past few years, there have sprung into existence a considerable number of learned societies devoted to special subjects, usually with unlocalized membership, and holding meetings from year to year in different cities. Among these are those named below:

- The American Anatomical Society.
- The American Dialect Society.
- The American Folk-lore Society.
- The American Geographical Society (of New York) and the National Geographic Society (of Washington).
- The American Geological Society.
- The American Historical Association.
- The American Institute of Mining Engineers.
- The American Meteorological Society.
- The American Metrological Society.
- The American Oriental Society.
- The American Ornithologists Union.
- The American Philological Association.
- The American Physiological Society.
- The American Society of Naturalists.
- The American Society for Psychical Research.
- The Archæological Institute of America.
- The Botanical Club of the American Association.
- The Franklin Institute.

That the organization of such societies had been so long delayed, was perhaps due to the fact that during the first six decades of the century the number of scientific investigators was comparatively small, and scientific work of original character was confined to a few of the large cities, so that local organizations, supplemented by the annual summer meetings of the American Association for the Advancement of Science, answered all needs. Since the close of the Civil War, and of the period of ten years which elapsed before our country was restored to commercial prosperity, and indeed before it had begun to fully feel the effects of the great scientific renaissance which originated in 1859 with the publication of Darwin's "Origin of Species," there has been a great increase in the number of persons whose time is chiefly devoted to original scientific work.

Nothing has contributed so materially to this state of affairs as the passage by Congress in 1862 of the bill, introduced by the Hon. Justin S. Morrill, of Vermont, to establish scientific and industrial educational institutions in every State, supplemented in 1887 by the Hatch bill for the founding of the agricultural experiment stations.¹ The movement was at first unpopular among American educators, but after a quarter of a century of trial the land-grant college system has not only demonstrated its right to exist, but is by many regarded as forming one of the chief strongholds of our national scientific prosperity.²

One of the most important effects of the movement has been to stimulate the establishment of State scientific schools and universities, and every one of the forty-two commonwealths has already a university or a college performing, or intended to perform, university functions.

It is worthy of remark that with six exceptions every State has in less than twenty years of its admission had a State college or university of its own. Only twelve have delayed more than ten years, and fifteen have come into the

¹ See App. D, and also A. C. True's "A Brief Account of the Experiment Station Movement in the United States," U. S. Department of Agriculture, Experiment Station Bulletin No. 1, 1889, pp. 73-78.

² The following statements were made in a Report of the Committee of the House of Representatives, March 3, 1886 :

"The act appropriating script to the amount of 30,000 acres for each Senator and Representative in Congress for the endowment of colleges for the benefit of agriculture and the mechanic arts, which was passed in 1862, has been fruitful. Some of the States endowed single colleges, while others divided the gift between two or three. There were 17,430,000 acres of script and land granted, and the fund arising from their sales is \$7,545,405. This has been increased by gifts from the States and from benevolent individuals of grounds, buildings, and apparatus to the amount of \$5,000,000 more. And the last reports show that these colleges employed more than four hundred professors, and had under instruction more than four thousand students. This donation of the public funds has been eminently profitable for the government and the country. Many thousands of young men educated in science have already gone out from their colleges to engage in the practical duties of life, and the provision is made for sending out a continued succession of these for all future time. And as science is not limited by State boundaries, it makes but little difference for the common good which of these institutions or States these graduates come from ; their attainments are for the common good."

Union already equipped. Ten of these were colonies and original States. All but one of the remainder were those admitted in 1889, for each of our four new States was provided with the nucleus of a State university before it sought admission to the Union. Twenty-eight of the State and Territorial Universities had their origin in land grants from the General Government other than those for agricultural and mechanical colleges.¹

The completeness of the State system of scientific educational institutions is in marked contrast with that of the scientific societies in the same States, organized by the direct action of the people rather than by government.

Academies of science bearing the names of the States of our confederation and often sanctioned by their laws, may be regarded as in some sense national. Although nearly all of our States have historical societies, only twelve of the forty-two have academies of science, or organizations which are their equivalent. That there should be in 1889 thirty States without academies of science, and fourteen States and Territories in which there are no scientific societies of any description whatever, is a noteworthy fact.²

¹ See Appendix E, and also F. W. Blackmar's "History of Federal and State Aid to Higher Education," etc., Washington, 1890.

² The following is a list of those already in existence :

STATE ACADEMIES OF SCIENCE, ETC., 1890.

CALIFORNIA.—The California Academy of Sciences, San Francisco, 1854.

COLUMBIA.—The Affiliated Scientific Societies of Washington City :—The Philosophical Society, 1871 ; The Anthropological Society, 1879 ; The Biological Society, 1880 ; The Chemical Society, 1889 ; The National Geographic Society, 1888.

CONNECTICUT.—The Connecticut Academy of Arts and Sciences, 1799.

INDIANA.—The Indiana Academy of Sciences, 1885.

IOWA.—The Iowa Academy of Sciences, Iowa City, 1875.

KANSAS.—The Kansas Academy of Science, Topeka, 1868.

MARYLAND.—The Maryland Academy of Sciences, Baltimore, 1822.

MASSACHUSETTS.—The American Academy of Arts and Sciences, Boston, 1780.

MINNESOTA.—The Minnesota Academy of Natural Sciences, Minneapolis, 1873.

MISSOURI.—The St. Louis Academy of Science, St. Louis, 1857.

NEW YORK.—The New York Academy of Science, New York City, 1817.

PENNSYLVANIA.—The American Philosophical Society, Philadelphia, 1743.

WISCONSIN.—Wisconsin Academy of Arts, Science, and Letters, Madison, 1870.

During Van Buren's presidency, the Department of Agriculture had its formal beginning.

The chief promoter of this idea was Henry L. Ellsworth, of Connecticut, Commissioner of Patents, whose efforts culminated twenty-six years later in the establishment of a department, and, after another period of twenty-six years, in the elevation of the head of that department to the dignity of a Cabinet officer. Ellsworth began work by distributing seeds and plants for experimental culture, acquiring these without expense, and sending them out under the franks of friendly Congressmen. After three years (in 1839) Congress recognized the value of the work in this direction by appropriating one thousand dollars from the Patent-Office fund to enable him to collect and distribute seeds, to collect agricultural statistics, and to make agricultural investigations. Appointed by Jackson in 1836, Ellsworth served through the two successive terms of Van Buren and Tyler, and in his nine years of official work his devotion to the interests of agriculture produced excellent results, and placed the service on a firm foundation. Though Newton was in name the first commissioner of agriculture, Ellsworth deserves to be kept in memory as the real founder of the department.

The appropriations at first were insignificant, and occasionally, as in 1841, 1842, and 1846, Congress seems to have forgotten to make any provision whatever for the work, which consequently went forward under difficulties. In 1853 the first appropriation directly for agriculture was made, in 1855 the whole amount up to that time withdrawn for this purpose from the Patent-Office fund was reimbursed, and from that time on the money grants became yearly larger, and the work was allowed slowly to expand. The seed work increased, and in 1856 a propagating garden was begun. The agricultural report, which began in 1841, and was until 1862 printed as a part of that of the Patent Office, became yearly more extensive, and showed a general average annual growth in value. In 1854 work in economic entomology began, with the appointment

of Townend Glover to investigate and report upon the habits of insects, injurious and beneficial to agriculture. In 1855 the chemical and botanical divisions were inaugurated.

David P. Holloway of Indiana, the thirteenth Commissioner of Patents, was instrumental in effecting a most important reform in the scientific administration of the government. In his first annual report, made in January, 1862, he advocated enthusiastically the creation of a Department of the Productive Arts, to be charged with the care of agriculture and all the other industrial interests of the country, and he was so far successful that, on May 15th, Congress established the Department of Agriculture. The first Commissioner was Isaac Newton, who had been for a year or more Superintendent of the Agricultural Division of the Patent Office. From 1862 to 1889 there were six Commissioners: Newton (1862-67), Capron (1867-71), Watts (1871-77), Le Duc (1877-81), Loring (1881-85), and Coleman (1885-89), and under the administration of each important advances were made, and the value of the work became yearly greater. Buildings were erected; a chemical laboratory established; the departments of animal industry, economic ornithology and mammalogy, pomology, vegetable pathology, silk culture, microscopy, forestry, and experiment stations were added, and the system of publications greatly extended. The department, as now organized, is one of the most vigorous of our national scientific institutions, and with its powerful staff and its close affiliations with the forty-six State agricultural experiment stations, manned as they are by nearly four hundred trained investigators, it has possibilities for the future which can scarcely be overestimated.¹

¹ The first agricultural "experiment station" under that specific designation in the United States was established at Middletown, Conn., in 1875, by the joint action of Mr. Orange Judd, the trustees of the university at Middletown, and the State Legislature, with Prof. W. O. Atwater, as director, and was located in the "Orange Judd Hall of Natural Science." The example was speedily followed elsewhere, so that in 1880 there were four, and in 1886 some seventeen of these institutions in fourteen States. The appropriation by Congress of \$15,000 per annum to each of the States and Territories which

The term of the ninth President was too short to afford matter for comment. It should be mentioned, however, that General Harrison published, in Cincinnati in 1838, "A Discourse on the Aborigines of the Valley of the Ohio," and was the only President except Jefferson and John Quincy Adams, who has ever produced a treatise upon a scientific theme.

Mr. Tyler's administration was chiefly remarkable by reason of the formal and final establishment of the National Observatory, which, as we have seen, took place in 1842.

President Polk served from 1845 to 1849. During this period the Smithsonian Institution was organized. The Coast Survey had been reorganized in 1843-44 under the superintendency of Alexander Dallas Bache; while the Observatory, under the patronage of Mr. George Bancroft, as Secretary of the Navy, had been greatly strengthened and extended; and in 1845 was founded at Annapolis the Naval Academy, an institution among whose graduates are numbered many

have established agricultural colleges, or agricultural departments of colleges, has led to the establishment of new stations or the increased development of stations previously established under State authority, so that there are to-day forty-six stations in the United States. Several of these have sub-stations working under their management. Every State has at least one station, several have two, one has three, and Dakota has set the Territories an example by establishing one within her boundaries.

These forty-six stations employ nearly 400 men in the prosecution of experimental inquiry. The appropriation by the United States Government for the current year, for them and for the Office of Experiment Stations in this Department, is \$600,000. The several States appropriate about \$125,000 in addition, making the sum total of about \$725,000 given from public funds, the present year, for the support of agricultural experiment stations in the United States.

"Of all the scientific enterprises which the Government has undertaken," wrote Secretary Coleman, "scarcely any other has impressed its value upon the people and their representatives in the State and national legislatures so speedily and so strongly as this. The rapid growth of an enterprise for elevating agriculture by the aid of science, its espousal by the United States Government, its development to its present dimensions in the short period of fourteen years, and, finally, the favor with which it is received by the public at large, are a striking illustration of the appreciation on the part of the American people of the wisdom and the usefulness of calling the highest science to the aid of the arts and industries of life."

men who have contributed materially to the advancement of science.

A little later, in 1848, in connection with the same movement, the position of Professor of Mathematics in the navy was dignified and improved, and their numbers limited with manifest advantage to the scientific service of the government.

During this and the succeeding administrations, governmental science, stimulated by Bache, Henry, and Maury, scientific administrators of a new and more vigorous type than had been previously known in Washington, rapidly advanced, and prior to 1861 the institutions then existing had made material progress.

Those of more recent growth, such as the Army Medical Museum, founded in 1862,¹ the Bureau of Education, founded in 1867,² the Fish Commission, founded in 1870,³ the Bureau of Ethnology, founded in 1879,⁴ although not less important than many of those already discussed, are so recent in origin that the events connected with their development have not passed into the domain of history.

The material results of the scientific work of the government during the past ten years undoubtedly surpass in extent all that had been accomplished during the previous hundred years of the independent existence of the nation. With this recent period the present paper has no concern, for it has been written from the standpoint of Carlyle, who, in "*Sartor Resartus*," states his belief that "in every phenomenon the beginning remains always the most notable moment."

It is nevertheless very encouraging to be assured that the attitude of our government toward scientific and educa-

¹ See J. S. Billings: "Medical Museums, with Special Reference to the Army Medical Museum at Washington." President's address, delivered before the Congress of American Physicians and Surgeons, September 20, 1888.

² See the eighteen annual reports of the Commission of Education.

³ See G. Brown Goode: "The Status of the U. S. Fish Commission in 1884," etc. Washington, 1884.

⁴ See the six annual reports of the Bureau, and the Smithsonian reports, 1879-88.

tional enterprises is every year becoming more and more in harmony with the hopes of the founders of our Republic—and in accord with the views of such men as Washington, Franklin, Jefferson, John Adams, Madison, Monroe, John Quincy Adams, Gallatin, and Rush.

It is also encouraging to know that the national attitude toward science is the subject of constant approving comment in Europe. Perhaps the most significant recent utterance was that of Sir Lyon Playfair in his address before the British Association for the Advancement of Science, at the Aberdeen meeting.

"On September 14, 1859," he said "I sat on this platform and listened to the eloquent address and wise counsel of the Prince Consort. At one time a member of the household, it was my privilege to co-operate with this illustrious prince in many questions relating to the advancement of science. I naturally, therefore, turned to his presidential address to see whether I might not now continue those counsels which he then gave with all the breadth and comprehensiveness of his masterly speeches. I found, as I expected, a text for my own discourse in some pregnant remarks which he made upon the relation of science to the State. They are as follows: 'We may be justified in hoping . . . that the Legislature and the State will more and more recognise the claims of science to their attention, so that it may no longer require the begging-box, but speak to the State like a favoured child to its parent, sure of his paternal solicitude for its welfare; that the State will recognise in science one of its elements of strength and prosperity, to foster which the clearest dictates of self-interest demand.'

"This opinion, in its broadest sense, means that the relations of science to the State should be made more intimate because the advance of science is needful to the public weal.

"The importance of promoting science as a duty of statecraft was well enough known to the ancients, especially to the Greeks and Arabs, but it ceased to be recognised in the dark ages, and was lost to sight during the revival of letters in the fifteenth and sixteenth centuries. Germany and France, which are now in such active competition in promoting science, have only publicly acknowledged its national importance in recent times. Even in the last century, though France had its Lavoisier and Germany its Leibnitz, their Governments did not know the value of science. When the former was condemned to death in the Reign of Terror, a petition was presented to the rulers that his life might be spared for a few weeks in order that he might complete some important experiments, but the reply was, 'The Republic has no need of savants.' Earlier in the century the much-praised Frederick William of Prussia shouted with a loud voice, during a graduation ceremony in the University of Frankfort, 'An ounce of Mother-wit is worth a ton of university wisdom.' Both France and Germany are now ashamed of these utterances of

their rulers, and make energetic efforts to advance science with the aid of their national resources. More remarkable is it to see a young nation like the United States reserving 150,000,000 acres of national lands for the promotion of scientific education. In some respects this young country is in advance of all European nations in joining science to its administrative offices. Its scientific publications are an example to other Governments. The Minister of Agriculture is surrounded with a staff of botanists and chemists. The Home Secretary is aided by a special Scientific Commission to investigate the habits, migrations, and food of fishes, and the latter has at its disposal two specially constructed steamers of large tonnage.

"In the United Kingdom we are just beginning to understand the wisdom of Washington's farewell address to his countrymen when he said: 'Promote, as an object of primary importance, institutions for the increase and diffusion of knowledge; in proportion as the structure of a Government gives force to public opinion, it is essential that public opinion should be enlightened.'"

APPENDIX A.

PLAN OF A FEDERAL UNIVERSITY.

[From the *Pennsylvania Gazette*, 1788. Quoted in the *Massachusetts Centinel*, Saturday, Nov. 29, 1788.]

"Your government cannot be executed, it is too extensive for a republic. It is contrary to the habits of the people" say the enemies of the Constitution of the United States. However opposite to the opinions and wishes of a majority of the citizens of the United States these declarations and predictions may be, they will certainly come to pass, unless the people are prepared for our new form of government, by an education adapted to the new and peculiar situation of our country,—To effect this great and necessary work, let one of the first acts of the new Congress be, to establish, within the district to be allotted for them, a federal University, into which the youth of the United States shall be received after they have finished their studies, and taken degrees in the colleges of their respective States. In this University let those branches of literature only be taught, which are calculated to prepare our youth for public and civil life. These branches should be taught by means of lectures, and the following arts and sciences should be the subject of them :

1. The principles and forms of government applied in a particular manner, to the explanation of every part of the Constitution and laws of the United States, together with the laws of nature and nations, which last should include everything that relates to peace, war, treaties, ambassadours, and the like.

2. History, both ancient and modern, and chronology.

3. Agriculture in all numerous and extensive branches.

4. The principles and practice of manufactures.

5. History, principles, objects, and channels of commerce.

6. Those parts of mathematicks, which are necessary to the division of property, to finance, and to the principles and practice of war—for there is too much reason to fear that war will continue, for some time to come, to be the unchristian mode of deciding disputes between christian nations.

7. Those parts of natural philosophy and chemistry, which admit of an application to agriculture, manufacture, commerce, and war.

8. Natural History, which includes the history of animals, vegetables, and fossils. To render instruction in these branches of science easy, it will be necessary to establish a museum, and also a garden, in which not only all the shrubs, etc., but all the forest trees of the United States should be cultivated. The great Linnæus of Upsal enlarged the commerce of Sweden, by his discoveries in natural history, he once saved the Swedish Navy, by finding out the time in which a worm laid its eggs, and recommending the immersion of the timber of which the ships were built, at that season wholly under water. So great were the services this illustrious naturalist rendered his country by the application of his knowledge to agriculture, manufacture, and commerce, that the present King of Sweden pronounced an eulogium upon him, from his throne, soon after his death.

9. Philology, which should include, under rhetoric and criticism, lectures upon the construction and pronunciation of the English language. Instruction in this branch of literature will become the more necessary in America, as our intercourse must soon cease with the bar, the stage and the pulpits of Great Britain, from whence we receive our knowledge of the pronunciation of the English language. Even modern English books should cease to be the models of stile in the United States. The present is the age of simplicity in writing in America. The turgid stile of Johnson, the purple glare of Gibbon, and even the studied and thickest metaphours of Junius are all equally unnatural, and should not be admitted into our country. The cultivation and perfection of our language becomes a matter of consequence when viewed in another light. It will probably be spoken by more people in the course of two or three centuries, than ever spoke any one language at one time since the creation of the world. When we consider the influence which the prevalence of only two languages, viz. the English and the Spanish, in the extensive regions of North and South America, will have upon manners, commerce, knowledge and civilization, scenes of human happiness and glory open before us, which elude from their magnitude the utmost grasp of the human understanding.

10. The German and French languages should be taught in this University, the many excellent books which are written in both these languages upon all subjects, more especially upon those which relate to the advancement of national improvements of all kinds, will render a knowledge of them an essential part of the education of a legislator of the United States.

11. All those athletick and manly exercises should likewise be taught in the University, which are calculated to impart health, strength, and elegance to the human body.

To render the instruction of our youth as easy and extensive as possible in several of the above mentioned branches of literature, let four young men of good education, and active minds be sent abroad at publick expense, to collect and transmit to the professors of the said branches all the improvements that are daily made in Europe in agriculture, manufactures, and commerce, and in the arts of war and practical government, this measure is rendered the more necessary from the distance of the United States from Europe, by which means the rays of knowledge strike the United States so partially that they can be brought to a useful focus, only by employing suitable men to collect and trans-

mit them to our country. It is in this manner that the northern nations of Europe have imported so much knowledge from their southern neighbors, that the history of the agriculture, manufactures, commerce, revenues, and military art of *one* of these nations will soon be alike applicable to all of them.

Besides sending four young men abroad to collect and transmit knowledge for the benefit of our country, *two* young men of suitable capacities should be employed, at the public expense, in exploring the vegetable, mineral, and animal productions of our country, in procuring histories and samples of each of them, and in transmitting them to the Professor of Natural History. It is in consequence of the discoveries made by young gentlemen employed for these purposes, that Sweden, Denmark, and Russia have extended their manufactures and commerce, so as to rival in both the oldest nations in Europe.

Let the Congress allow a liberal salary to the Principal of this University. Let it be his business to govern the students, and to inspire them by his conversation, and by his occasional publick discourses, with federal and patriotic sentiments. Let this Principal be a man of extensive education, liberal manners, and dignified deportment.

Let the Professors of each of the branches that have been mentioned, have a moderate salary of 150 or 200 pounds a year, and let them depend upon the number of their pupils to supply the deficiency of their maintenance from their salaries. Let each pupil pay for each course of lectures two or three guineas.

Let the degrees conferred in this University receive a new name, that shall designate the design of an education for civil and publick life. Should this plan of a federal University, or one like it, be adopted, then will begin the golden age of the United States. While the business of education in Europe consists in lectures upon the ruins of Palmyra, and the antiquities of Herculaneum ; or in dispute about Hebrew points, Greek particles, or the accent and quantity of the Roman language, the youth of America will be employed in acquiring those branches of knowledge which increase the convenience of life, lessen human misery, improve our country, promote population, exalt the human understanding, and establish domestick, social, and political happiness.

Let it not be said, that this is not the *time* for such a literary and political establishment. Let us first restore publick credit, by funding or paying our debts—let us regulate our militia—let us build a navy—and let us protect and extend our commerce. After this we shall have leisure and money to establish a University for the purposes that have been mentioned. This is false reasoning. We shall never restore publick credit—regulate our militia—build a navy—or revive our commerce, until we remove the ignorance and prejudices, and change the habits of our citizens, and this can never be done until we inspire them with federal principles, which can only be effected by our young men meeting and spending two or three years together in a National University, and afterwards disseminating their knowledge and principles through every county, town, and village of the United States. Until this is done—Senators and Representatives of the United States, you will undertake to make bricks

without straw. Your supposed union in Congress will be a rope of sand. The inhabitants of Massachusetts began the business of government by establishing the University of Cambridge, and the wisest Kings in Europe have always found their literary institutions the surest means of establishing their power, as well as of promoting the prosperity of their people.

These hints for establishing the constitution and happiness of the United States upon a permanent foundation are submitted to the friends of the federal government, in each of the States, by a Private CITIZEN OF PENNSYLVANIA.

APPENDIX B.

ADDRESS TO THE PEOPLE OF THE UNITED STATES.

1787.

By Benjamin Rush, M.D.

[Reprinted from Niles's, "Principles and Acts of the Revolution in America," pp. 402-404.]

There is nothing more common than to confound the terms of *American Revolution* with those of *the late American war*. The American war is over, but this is far from being the case with the American Revolution. On the contrary, nothing but the great drama is closed. It remains yet to establish and perfect our new forms of government, and to prepare the principles, morals, and manners of our citizens for these forms of government after they are established and brought to perfection.

The confederation, together with most of our State constitutions, was formed under very unfavorable circumstances. We had just emerged from a corrupted monarchy. Although we understood perfectly the principles of liberty, yet most of us were ignorant of the forms and combinations of power in republics. Add to this, the British army was in the heart of our country, spreading desolation wherever it went: our resentments, of course, were awakened. We detested the British name, and, unfortunately, refused to copy some things in the administration of justice and power in the British government which have made it the envy and admiration of the world. In our opposition to monarchy, we forgot that the temple of tyranny has two doors. We bolted one of them by the proper restraints, but we left the other open by neglecting to guard against the effects of our own ignorance and licentiousness. Most of the present difficulties of this country arise from the weakness and other defects of our governments.

My business at present shall be only to suggest the defects of the confederation. These consist—1st. In the deficiency of coercive power. 2d. In a defect of exclusive power to issue paper money and regulate commerce. 3d. In vest-

ing the sovereign power of the United States in a single legislature ; and, 4th, in the too frequent rotation of its members.

A convention is to sit soon for the purpose of devising means of obviating part of the two first defects that have been mentioned. But I wish they may add to their recommendations to each State, to surrender up to Congress their power of emitting money. In this way, a uniform currency will be produced, that will facilitate trade, and help to bind the States together. Nor will the States be deprived of large sums of money by this mean, when sudden emergencies require it, for they may always borrow them, as they did during the war, out of the treasury of Congress. Even a loan office may be better instituted in this way in each State than in any other.

The two last defects that have been mentioned are not of less magnitude than the first. Indeed, the single legislature of Congress will become more dangerous from an increase of power than ever. To remedy this, let the supreme federal power be divided, like the legislatures of most of our States, into two distinct, independent branches. Let one of them be styled the Council of the States, and the other the Assembly of the States. Let the first consist of a single delegate, and the second of two, three, or four delegates, chosen annually by each State. Let the President be chosen annually by the joint ballot of both Houses, and let him possess certain powers, in conjunction with a privy council, especially the power of appointing most of the officers of the United States. The officers of the United States. The officers will not only be better when appointed in this way, but one of the principal causes of faction will be thereby removed from Congress. I apprehend this division of the power of Congress will become more necessary as soon as they are invested with more ample powers of levying and expending the public money.

The custom of turning men out of power or office as soon as they are qualified for it has been found to be as absurd in practice as it is virtuous to dismiss a general, a physician, or even a domestic, as soon as they have acquired knowledge sufficient to be useful to us, for the sake of increasing the number of able generals, skilful physicians, and faithful servants? We do not. Government is a science, and can never be perfect in America until we encourage men to devote not only three years but their whole lives to it. I believe the principal reason why so many men of abilities object to serving in Congress is owing to their not thinking it worth while to spend three years in acquiring a profession which their country immediately afterwards forbids them to follow.

There are two errors or prejudices on the subject of government in America which lead to the most dangerous consequences.

It is often said "that the sovereign and all other power is seated *in* the people." This idea is unhappily expressed. It should be, "all power is derived *from* the people"; they possess it only on the days of their elections. After this, it is the property of their rulers; nor can they exercise or resume it, unless it be abused. It is of importance to circulate this idea, as it leads to order and good government.

The people of America have mistaken the meaning of the word sovereignty, hence each State pretends to be *sovereign*. In Europe it is applied only to those states which possess the power of making war and peace, of forming

treaties, and the like. As this power belongs only to Congress, they are the only *sovereign* power in the United States.

We commit a similar mistake in our ideas of the word independent. No individual State, as such, has any claim to independence; she is independent only in a union with her sister States in Congress.

To conform the principles, morals and manners of our citizens, to our republican forms of government, it is absolutely necessary that knowledge of every kind should be disseminated through every part of the United States.

For this purpose, let Congress, instead of laying out half a million of dollars in building a federal town, appropriate only a fourth of that sum in founding a federal university. In this university let every thing connected with government, such as history—the law of nature and nations—the civil law—the municipal laws of our country—and the principles of commerce—be taught by competent professors. Let masters be employed likewise to teach gunnery, fortification, and every thing connected with defensive and offensive war. Above all, let a professor of, what is called in the European universities, economy, be established in this federal seminary. His business should be to unfold the principles and practice of agriculture and manufactures of all kind, and to enable him to make his lectures more extensively useful, Congress should support a travelling correspondent for him, who should visit all the nations of Europe, and transmit to him, from time to time, all the discoveries and improvements that are made in agriculture and manufactures. To this seminary young men should be encouraged to repair, after completing their academical studies in the colleges of their respective States. The honors and offices of the United States should, after a while, be confined to persons who had imbibed federal and republican ideas in this university.

For the purpose of diffusing knowledge, as well as extending the living principle of government to every part of the United States—every State—city—county—village—and township in the Union, should be tied together by means of the post-office. This is the true non-electric wire of government. It is the only means of conveying heat and light to every individual in the federal commonwealth. "Sweden lost her liberties," says the Abbe Raynal, "because her citizens were so scattered, that they had no means of acting in concert with each other." It should be a constant injunction to the post-masters to convey newspapers free of all charge for postage. They are not only the vehicles of knowledge and intelligence, but the centinels of the liberties of our country.

The conduct of some of those strangers who have visited our country since the peace, and who fill the British papers with accounts of our distresses, shews as great a want of good sense, as it does of good-nature. They see nothing but the foundations and walls of the temple of liberty; and yet they undertake to judge of the whole fabric.

Our own citizens act a still more absurd part, when they cry out, after the experience of three or four years, that we are not proper materials for republican government. Remember we assumed these forms of government in a hurry, before we were prepared for them. Let every man exert himself in promoting virtue and knowledge in our country, and we shall soon become good republicans. Look at the steps by which governments have been changed,

or rendered stable in Europe. Read the history of Great Britain. Her boasted government has risen out of wars and rebellions that lasted above six hundred years. The United States are travelling peaceably into order and good government. They know no strife but what arises from the collision of opinions; and, in three years, they have advanced further in the road to stability and happiness, than most of the nations in Europe have done, in as many centuries.

There is but one path that can lead the United States to destruction; and that is, their extent of territory. It is probable to effect this, that Great Britain ceded to us so much waste land. But even this path may be avoided. Let but one new State be exposed to sale at a time, and let the land-office be shut up, till every part of this new State be settled.

I am extremely sorry to find a passion for retirement so universal among the patriots and heroes of the war. They resemble skilful mariners who, after exerting themselves to preserve a ship from sinking in a storm in the middle of the ocean, drop asleep as soon as the waves subside, and leave the care of their lives and property during the remainder of the voyage to sailors without knowledge or experience. Every man in a republic is public property. His time and talents—his youth—his manhood—his old age—nay more, his life, his all, belong to his country.

Patriots of 1774, 1775, 1776—heroes of 1778, 1779, 1780! come forward! your country demands your services! Philosophers and friends of mankind, come forward! your country demands your studies and speculations! Lovers of peace and order, who declined taking part in the late war, come forward! your country forgives your timidity and demands your influence and advice! Hear her proclaiming, in sighs and groans, in her governments, in her finances, in her trade, in her manufactures, in her morals, and in her manners,

“THE REVOLUTION IS NOT OVER!”

APPENDIX C.

PROSPECTUS OF A NATIONAL INSTITUTION, TO BE ESTABLISHED IN THE UNITED STATES.

By JOEL BARLOW.

1806.

[Reprinted from a defective copy of Barlow's pamphlet in the Congressional Library, supplemented by the reprint in the *National Intelligencer* of 1806, and a MS. copy in the possession of Dr. J. C. Welling.]

The project for erecting a university at the seat of the federal government is brought forward at a happy moment, and on liberal principles. We may therefore reasonably hope for an extensive endowment from the munificence of individuals, as well as from government itself. This expectation will naturally lead us to enlarge our ideas on the subject, and to give a greater scope to its

practical operation than has usually been contemplated in institutions of a similar nature.

Two distinct objects, which, in other countries have been kept asunder, may and ought to be united ; they are both of great national importance ; and by being embraced in the same Institution, they will aid each other in their acquisition. These are the advancement of knowledge by associations of scientific men, and the dissemination of its rudiments by the instruction of youth. The first has been the business of learned corporations, such as the Royal Society of London, and the National Institute of France ; the second is pursued by collections of instructors, under the name of universities, colleges, academies, etc.

The leading principle of uniting these two branches of improvement in one Institution, to be extended upon a scale that will render it truly national, requires some developement. We find ourselves in possession of a country so vast as to lead the mind to anticipate a scene of social intercourse and interest unexampled in the experience of mankind. This territory presents and will present such a variety of productions, natural and artificial, such a diversity of connections abroad, and of manners, habits, and propensities at home, as will create a strong tendency to diverge and separate the views of those who shall inhabit the different regions within our limits.

It is most essential to the happiness of the people and to the preservation of their republican principles, that this tendency to a separation should be overbalanced by superior motives to a harmony of sentiment ; that they may habitually feel that community of interest on which their federal system is founded. This desirable object is to be attained, not only by the operations of the government in its several departments, but by those of literature, sciences, and arts. The liberal sciences are in their nature republican ; they delight in reciprocal communication ; they cherish fraternal feelings, and lead to a freedom of intercourse, combined with the restraints of society, which contribute together to our improvement.

To explore the natural productions of our country, give an enlightened direction to the labors of industry, explain the advantages of interior tranquillity, of moderation and justice in the pursuits of self-interest, and to promote as far as circumstances will admit, an assimilation of civil regulations, political principles and modes of education, must engage the solicitude of every patriotic citizen ; as he must perceive in them the necessary means of securing good morals and every republican virtue ; a wholesome jealousy of right and a clear understanding of duty ; without which, no people can be expected to enjoy the one or perform the other for any number of years.

The time is fast approaching when the United States, if no foreign disputes should induce an extraordinary expenditure of money, will be out of debt. From that time forward, the greater part of their public revenue may, and probably will, be applied to public improvements of various kinds ; such as facilitating the intercourse through all parts of their dominion by roads, bridges, and canals ; such as making more exact surveys, and forming maps and charts of the interior country, and of the coasts, bays and harbors, perfecting the system of lights, buoys, and other nautical aids ; such as encouraging new branches of industry, so far as may be advantageous to the public, either by offering premiums for discoveries, or by purchasing from their proprietors such inven-

tions as shall appear to be of immediate and general utility, and rendering them free to the citizens at large ; such as exploring the remaining parts of the wilderness of our continent, both within and without our own jurisdiction, and extending to their savage inhabitants, as far as may be practicable, a taste for civilization, and the means of knowing the comforts that men are capable of yielding to each other in the peaceable pursuits of industry, as they are understood in our stage of society.

To prepare the way for the government to act on these great objects with intelligence, economy, and effect, and to aid its operations when it shall be ready to apply its funds to that purpose, will occupy in part the attention of that branch of the Institution composed of men of scientific research ; whose labors, it is expected, will be in a great measure gratuitous. It cannot be too early, even at this moment, to direct the researches of science to occupations of this nature. By these means, at the end of the eleven years, the epoch at which the government may expect to be free of debt, the way can be prepared to begin with system, and proceed with regularity in the various details of public improvement ; a business which, if the rulers of all nations did but know it, ought to be considered among the first of their duties, one of the principal objects of their appointment.

The science of political economy is still in its infancy ; as indeed is the whole science of government, if we regard it as founded on principles analogous to the nature of man, and designed to promote his happiness. As we believe our government to be founded on these principles, we cannot but perceive an immense field of improvement opening before us ; a field in which all the physical as well as the moral sciences should lend their aid and unite their operation, to place human society on such a footing in this great section of the habitable world, as to secure it against farther convulsions from violence and war. Mankind have a right to expect this example from us ; we alone are in a situation to hold it up before them, to command their esteem, and perhaps their imitation. Should we, by a narrowness of views, neglect the opportunity of realizing so many benefits, we ought to reflect that it never can occur to us again ; nor can we foresee that it will return to any age or nation. We should grievously disappoint the expectations of all good in other countries, we should ourselves regret our error while we live ; and if posterity did not load us with the reproaches we should merit, it would be because our conduct will have kept them ignorant of the possibility of obtaining the blessings, of which it had deprived them.

It would be superfluous, in this Prospectus, to point out the objects merely scientific, that will naturally engage the attention of this branch of the Institution. We are sensible that many of the sciences, physical as well as moral, are very little advanced ; some of them, in which we seem to have made considerable progress, are yet so uncertain as to leave it doubtful whether even their first principles do not remain to be discovered ; and in all of them, there is a great deficiency as to the mode of familiarising their results, and applying them to the useful arts of life, the true object of all labor and research.

What a range is open in this country for mineralogy and botany ! How many new arts are to arise, and how far the old ones are to be advanced, by the pursuit of these two sciences, it is impossible even to imagine. Chemistry is making

a rapid and useful progress, though we still dispute about its elements. Our knowledge of anatomy has laid a necessary and sure foundation for surgery and medicine ; surgery indeed is making great proficiency ; but, after three thousand years of recorded experience, how little do we know of medicine ! Mechanics and hydraulics are progressing fast, and wonderful are the facilities and comforts we draw from them ; but while it continues to be necessary to make use of animal force to move heavy bodies in any direction by land or water, we have a right to anticipate new discoveries. Could the genius of a Bacon place itself on the high ground of all the sciences in their present state of advancement, and marshal them before him in so great a country as this, and under a government like ours, he would point out their objects, foretell their successes, and move them on their march, in a manner that should animate their votaries and greatly accelerate their progress.

The mathematics, considered as a science, may probably be susceptible of higher powers than it has yet attained ; considered as the handmaid of all the sciences and all the arts, it doubtless remains to be simplified. Some new processes, and perhaps new modes of expressing quantities and numbers, may yet be discovered, to assist the mind in climbing the difficult steps that lead to an elevation so much above our crude conceptions ; an elevation that subjects the material universe, with all its abstractions of space and time, to our inspection ; and opens, from their combinations, so many useful and satisfying truths.

Researches in literature, to which may be united those in morals, government, and laws, are so vague in their nature, and have been so little methodised, as scarcely to have obtained the name of sciences. No man has denied the importance of these pursuits ; though the English nation, from whom we have borrowed so many useful things, has not thought proper to give them that consistency and standing among the objects of laudable ambition, to which they are entitled. Men the most eminent in these studies have not been members of their learned associations. Locke, Berkeley, Pope, Hume, Robertson, Gibbon, Adam Smith, and Blackstone, were never admitted into the Royal Society. This is doubtless owing to the nature of their government ; though the government itself exerts no influence in these elections. The science of morals connects itself so intimately with the principles of political institutions, that where it is deemed expedient to keep the latter out of sight, it is not strange that the former should meet no encouragement.

This policy is strikingly exemplified in the history of the French Institute. That learned and respectable body was incorporated by the National Convention in the year 1795, and took place of all the old academies, which had been previously abolished. It was composed of three classes, according to the objects to be pursued by its members. The first was the class for the physical sciences, the second was the class for the moral and political sciences, the third was for the fine arts. Thus it went on and made great progress in several branches, till the year 1803, when Bonaparte's government assumed that character which rendered the pursuit of moral and political science inconvenient to him. He then new modelled the Institute, and abolished that class. But lest his real object should be perceived, and he be accused of narrowing the compass of research, he created two new classes in the room of this ; one for

ancient literature, and one for the French language. On the same occasion an order was issued to all the colleges and great schools in France, suppressing the professorships of moral and political philosophy.

But in our country, and at this early epoch in the course of republican experiment, no subjects of research can be more important than those embraced by these branches of science. Our *representative* system is new in practice, though some theories of that sort have been framed by speculative writers ; and partial trials have been made in the British Dominions. But our *federal* system, combined with democratical representation, is a magnificent stranger upon earth ; a new world of experiment, bursting with incalculable omens on the view of mankind. It was the result of circumstances which no man could foresee, and no writer pretended to contemplate. It presented itself to us from the necessity of the situation we were in ; dreaded at first as an evil by many good men in our own country, as well as by our friends in Europe ; and it is at this day far from being understood, or properly appreciated, by the generality of those who admire it. Our practice upon it, as far as we have gone, and the vast regions of our continent that present themselves to its embrace, must convince the world that it is the greatest improvement on the mechanism of government that has ever been discovered, the most consoling to the friends of liberty, humanity, and peace.

Men who have grown old in the intrigues of cabinets, and those who, in the frenzy of youthful ambition, present themselves on the theatre of politics, at the head of armies, which they cannot live without, are telling us that 'no new principle of government has been discovered for these two thousand years'¹ ; and that all proposals to ameliorate the system are vain abstractions, unworthy of a sound philosophy. They may tell us too that no new principle in mechanics had been discovered since we came to the knowledge of the lever ; no new principle in war, since we first found that a man would cease to fight the moment he was killed. Yet we see in the two latter cases that new *combinations* of principle have been discovered ; they are daily now discovered and carried into practice. In these there are no books written to inform us we can go no further ; no imperial decrees to arrest our progress. Why then should this be the case in those combinations of the moral sense of man, which compose the science of government ?

But whether we consider the principles themselves as new, or the combination only as new, the fact with respect to our government is this : although the principle has long since been known that the powers necessarily exercised in regulating a great community, originate in the people at large, and that these powers cannot conveniently be exercised by the people at large ; yet it was not discovered how these powers could be conveniently exercised by a few delegates, in such a manner as to be constantly kept within the reach of the people at large, so as to be controlled by them without a convulsion. But a mode of doing this has been discovered in later years, and is now for the first time carried into practice in our country ; I do not say in the utmost perfection of which the principle is capable ;

¹ This is asserted in a book written to support the present government of France. I forget the title.

yet in a manner which greatly contributes, with our other advantages, to render us the happiest people on earth. Again although the principle has long since been known, that good laws faithfully executed within a state, would protect the industry of men, and preserve interior tranquillity ; yet no method was discovered which would effectually preserve exterior tranquility between state and state. Treaties were made, oaths were exacted, the name of God was invoked, forts, garrisons, and armies were established on their respective frontiers ; all with the sincere desire, no doubt, of preserving peace. The whole of these precautions have been constantly found ineffectual. But we at last, and almost by accident, have discovered a mode of preserving peace among states, without any of the old precautions ; which were always found extremely expensive, destructive to liberty, and incapable of securing the object. We have found that states have some interests that are common and mutual among themselves ; that so far as these interests go, the states should not be independent ; that without losing any thing of their dignity, but rather increasing it, they can bind themselves together by federal government, composed of their own delegates, frequently and freely elected, to whom they can confide these common interests ; and that by giving up to these delegates the exercise of certain acts of sovereignty, and retaining the rest to themselves, each state puts it out of its own power to withdraw from the confederation, and out of the power of the general government to deprive them of the rights they have retained.

If these are not new principles of government, they are at least new combinations of principles, which require to be developed, studied and understood better than they have been, even by ourselves ; but especially by the rising generation, and by all foreign observers who shall study our institutions. Foreigners will thus give us credit for what we have done, point out to our attention what we have omitted to do, and perhaps aid us with their lights, in bringing towards perfection a system, which may be destined to ameliorate the condition of the human race.

It is in this view that moral and political research ought to be regarded as one of the most important objects of the National Institution, the highest theme of literary emulation, whether in prose or verse, the constant stimulus to excite the ambition of youth in the course of education.

What are called the fine arts, in distinction from what are called the useful, have been but little cultivated in America. Indeed, few of them have yet arrived, in modern times, to that degree of splendor which they had acquired among the ancients. Here we must examine an opinion, entertained by some persons, that the encouragement of the fine arts savors too much of luxury, and is unfavorable to republican principles. It is true, as is alleged, they have usually flourished most under despotic governments ; but so have corn and cattle. Republican principles have never been organised or understood, so as to form a government, in any country but our own. It is therefore from theory, rather than example, that we must reason on this subject. There is no doubt but that fine arts, both in those who cultivate and those who only admire them, open and expand the mind to great ideas. They inspire liberal feelings, create a harmony of temper, favorable to a sense of justice and a habit of moderation in our social intercourse. By increasing the circle of our pleasures,

they moderate the intensity with which pleasures, not dependent on them, would be pursued. In proportion as they multiply our wants, they stimulate our industry, they diversify the objects of our ambition, they furnish new motives for a constant activity of mind and body, highly favorable to the health of both. The encouragement of a taste for elegant luxuries discourages the relish for luxuries that are gross and sensual, debilitating to the body, and demoralising to the mind. These last, it must be acknowledged, are prevailing in our country; they are perhaps the natural growth of domestic affluence and civil liberty. The government, however mild and paternal, cannot check them by any direct application of its powers, without improper encroachments on the liberty and affluence, that give them birth. But a taste for the elegant enjoyments which spring from the culture of the fine arts, excites passions not so irresistible, but that they are easily kept within the limits, which the means of each individual will prescribe. It is the friend of morals and of health; it supposes a certain degree of information; it necessitates liberal instruction; it cannot but be favorable to republican manners, principles, and discipline.

A taste for these arts is peculiarly desirable in those parts of our country, at the southward and westward, where the earth yields her rich productions with little labor, and leaves to the cultivator considerable vacancies of time and superfluities of wealth, which otherwise will, in all probability, be worse employed. The arts of drawing, painting, statuary, engraving, music, poetry, ornamental architecture, and ornamental gardening would employ a portion of the surplus time and money of our citizens; and at the same time be more likely to dispose their minds to devote another portion to charitable and patriotic purposes, than if the first portion had not been thus employed.

In England there is a Royal Academy for the fine arts, as well as a Royal Society for the sciences; though men of merit in other learned labors are not associated. In France the two classes of eminent men who pursue the sciences and the arts, are united in the National Institute. Besides these, and besides the colleges and universities, there exists in each of these countries a variety of institutions useful in their different objects, and highly conducive to the general mass of public improvement, as well as to private instruction.

The French government supports:

1. *The School of Mines*, an extensive establishment; where is preserved a collection of specimens from all the mines, wrought and unwrought, that are known to exist in that country; where, with the free use of a laboratory, lectures are given gratis one day in the week for nine months in the year, and where young men receive what is called a mineralogical education. At this place the proprietor of a mine, whether of metals, coals, or other valuable fossils, may have them examined without expense; and here he can apply for an able and scientific artist, recommended by the professors, to be the conductor of his works, as well in the engineering as the metallurgical branch.

2. *The School of Roads and Bridges*; whose title ought to extend likewise to canals, river navigation and hydraulic architecture; since it embraces all these objects. Here are preserved models and drawings of all the great works, and many of the abortive attempts, in these branches of business. It is a curious and useful collection. This establishment too maintains its professors, who

give lectures gratis, and produce among their pupils the ablest draftsmen and civil engineers, ready to be employed where the public service or private enterprise may require.

3. *The Conservatory of Arts*; meaning the useful arts and trades. This, in appearance, is a vast Babel of materials; consisting of tools, models, and entire machines, ancient and modern, good and bad. For it is often useful to preserve for inspection a bad machine. The professor explains the reason why it did not answer the purpose; and this either prevents another person from spending his time and money in pursuit of the same impracticable scheme, or it may lead his mind to some ingenious invention to remedy the defect and make it a useful object. Here is a professor for explaining the use of the machines, and for aiding the minister in discharging the duties of the patent office. Here likewise several trades are carried on, and persons are taught gratis the use of the tools by practice as well as by lectures.

4. *The Museum of Natural History*. This consists of a botanival garden, an extensive menagerie, or collection of wild animals, and large cabinets of minerals. To this institution are attached several professorships; and lectures are given in every branch of natural history.

5. *The Museum of Arts*; meaning the fine arts. This is the school for painting, statuary, music, &c. The great splendor of this establishment consists chiefly in its vast gallery of pictures, and its awful synod of statues. These are as far beyond description as they are above comparison. Since, to the collections of the kings of France, the government has added so many of the best productions of Italy, Flanders and Holland, there is no other assemblage of the works of art where students can be so well accommodated with variety and excellence, to excite their emulation and form their taste.

6. *The National Library*. This collection is likewise unparalleled both for the number and variety of works it contains; having about five hundred thousand volumes, in print and manuscript; besides all of value that is extant in maps, charts, engravings; and a museum of coins, medals and inscriptions, ancient and modern.

8. *The Mint*; which is a scientific as well as a laboratorial establishment; where lectures are given in mineralogy, metallurgy, and chemistry.

9. *The Military School*; where field engineering, fortification, gunnery, attack and defence of places, and the branches of mathematics, necessary to these sciences, are taught by experienced masters.

10. *The Prytaneum*; which is an excellent school of general science, more especially military and nautical; but it is exclusively devoted to what are called *enfants de la patrie*, children of the country, or boys adopted by the government, and educated at the public expense. They are generally those whose fathers have died in the public service. But this distinction is often conferred on others, through particular favor. The school is supplied with able instructors; and the pupils are very numerous. They are taught to consider themselves entirely devoted to the service of their country, as is indicated both by their own appellation and that of their seminary.

11. *The College of France* retains all its ancient advantages, and has been improved by the revolution.

12. *The School of Medicine*, united with anatomy and surgery, is in able hands, and well conducted.

13. *The Veterinary School*; where practical and scientific lessons are given on the constitution and diseases of animals.

14. *The Observatory* is an appellation still retained by an eminent school of astronomy; though its importance has grown far beyond what is indicated by its name. It publishes the annual work called *la connaissance des tems*; a work not only of national but of universal utility for navigators and astronomers.

15. Another institution, whose functions have outgrown its name, is the *Bureau of Longitude*. It not only offers premiums for discoveries, tending to the great object of finding an easy method of ascertaining the longitude at sea, and judges of their merit; but it is the encourager and depositary of all nautical and geographical discoveries; and, in conjunction with the school of astronomy and that of natural history, it directs and superintends such voyages of discovery as the government chooses to undertake.

16. The last public establishment for liberal instruction, that I shall mention in the capital, though not the only remaining one that might be named, is the *Polytechnic School*. This, for the variety of sciences taught, the degree of previous attainment necessary for admission, the eminent talents of the professors, and the high state of erudition to which the pupils are carried, is doubtless the first institution in the world.

The Prytaneum, the Polytechnic School, the Museum of Arts, the Conservatory of Arts, and the Veterinary School, are new institutions, established during the revolution. The others existed before; but most of them have been much improved. There were likewise erected during the same period, a great number of provincial colleges. The general provision was to have one in each county, or department, of which there are upwards of a hundred in France. The provision likewise extended to what are called primary schools, to be erected and multiplied in every town and village. This is also executed in part, but not completely.

On the whole, the business of education in France is on a much better footing at present than it ever was before the revolution. The clamor that was raised by the emigrants against the convention, reproaching them with having destroyed education, were unfounded, and, we may almost say, the reverse of truth. Their plans on this subject were great, and in general good; much good indeed has grown out of them; though they have not been pursued by the government during its subsequent changes, in the manner contemplated by the projectors.

Besides the public foundations, established and partly supported by the government, there is a variety of private associations for collecting and diffusing information; such as agricultural societies, a society for the encouragement of arts and manufactures; and another which, though neither scientific nor literary, is a great encourager of literature. It is a charitable fund for giving relief to indigent authors, and to their widows and orphans.

The Lyceum of Arts, as a private society, merits a distinguished place in this hasty review of the liberal establishments in Paris. This foundation belongs to a number of proprietors, who draw no other advantage from it than

the right of attending the lectures, and of using the laboratory, reading-rooms, library, and philosophical apparatus. It employs able professors in all the sciences, in technology, in literature, and in several modern languages. It admits annual subscribers, who enjoy these advantages during the year ; and it is particularly useful to strangers and to young men from the provinces, who might otherwise employ their leisure hours in less profitable amusements.

If, in speaking of the state of public instruction in England, we are less particular than in those of her neighbors, it will not be for want of respect for her institutions ; but because most of them are better known in this country, and some of them similar to those we have described. Her universities and colleges, her numerous agricultural societies, her society of arts and manufactures, her royal society, royal academy, royal observatory, British Museum, marine and military academies, her society for exploring the interior of Africa, her missionary society, and her board of longitude, are probably familiar to most of the readers of this Prospectus. We shall particularise only two or three others ; which, being of recent date, are probably less known.

" *The Literary Fund*, for the relief of indigent authors and their families, is an institution of extensive and increasing beneficence. It is not merely a charitable, but a patriotic endowment ; and its influence must extend to other nations, and to posterity. For an author of merit belongs to the world at large ; his genius is not the property of one age or nation, but the general heritage of all. When a fund like this is administered by men of discernment and fidelity, worthy of their trust, as the one in question certainly is, lending its aid to all proper objects, without regard to party or system, whether in politics, science or religion, it gives independence to literary pursuits. Men who are fostered by it, or feel a confidence that they may, in case of need, partake of its munificence, become bold in the developement of useful truths ; they are not discouraged by the dread of opposing the opinions of vulgar minds, whether among members of the government or powerful individuals.

This generous and energetic establishment owes its foundation to David Williams ; whose luminous writings, as well as other labors, in favor of liberty and morals, are well known in this country. It was a new attempt to utilize the gifts of fortune, and the efforts of timid merit. It was not till after many years of exertion by its patriotic founder, that the institution assumed a vigorous existence, became rich by the donations of the opulent, and popular from the patronage of the first names in the kingdom. It was from this fund that the one of a similar nature in Paris was copied ; but the latter is hitherto far inferior to the former, both in its endowments and its activity.

On the other hand, the *Royal Institution* and the *London Institution* have been copied from the Lyceum in Paris. But in these instances the copies have already equalled, if not surpassed, the original.

We have traced this rapid sketch of what is doing for the advancement of liberal knowledge and public improvements in other countries, for the sake of grouping the whole in one general view ; that we may compare their establishments with our situation, our wants, our means, and our prospects ; reject what is unsuitable to us, adopt such as would be useful, and organise them as shall be advantageous in our National Institution.

It is proposed, as already observed, that this Institution should combine the two great objects, *research* and *instruction*. It is expected from every member that he will employ his talent gratuitously in contributing to the *first* of these objects. The *second* will be the special occupation of a branch of the Institution, to be stiled the Professorate. And, as it is expected from the members of this branch, that they devote their time as well as talents to the labor of instruction, they will receive a suitable compensation, to be fixed by the board of trustees.

The members of the National Institution shall be elected from citizens of the United States, eminent in any of the liberal sciences, whether physical, moral, political, or economical ; in literature, arts, agriculture ; in mechanical, nautical, or geographical discoveries. The number of members shall at no time exceed the decuple of the number of states, composing the confederation of the United States. But in addition to these, it may elect honorary members abroad, not exceeding in number one half of that of its members. And it may likewise elect corresponding members within the United States, or elsewhere, not exceeding the last-mentioned proportion.

The members of the Institution may divide themselves into several sections, for their more convenient deliberations on the objects of their several pursuits, not exceeding five sections. Each section shall keep a register of its proceedings. It shall be the duty of each section to nominate candidates for members of the Institution, suitable for such section. Which nomination, if there be vacancies, shall entitle such candidates to be balloted for at the general meetings.

There shall be a Chancellor of the National Institution ; whose duty it shall be to superintend its general concerns. He shall, in the first instance, be appointed by the President of the United States ; and hold his office during the pleasure of the Institution. He shall preside in its general meetings ; direct the order of its deliberations, and sign the diplomas of its members. He shall be president of the board of trustees ; and, in consequence of their appropriations, order the payment of monies, and otherwise carry into execution their ordinances and resolutions. He shall be director of the Professorate ; order the courses of lectures and other modes of instruction, and objects of study ; confer degrees in the central university ; appoint examiners, either at the district colleges or at the central university, for the admission of students into the latter ; fill vacancies in the Professorate, until the next meeting of the board of trustees ; and he shall have power to suspend from office a professor, until the time of such meeting. He shall instruct and direct in their mission, such travelling professors as the board of trustees shall employ, for the objects of science, in our country or abroad.

The board of trustees shall consist of fifteen members ; they shall be first appointed by the President of the United States, and hold their office during the pleasure of the Institution. They shall give bonds with surety for the faithful execution of their trust. They and the chancellor are of course members of the Institution. As soon as convenient after their appointment, they are to assemble at the seat of government, elect by ballot fifteen additional members of the Institution, appoint three professors, and transact such other

business as they may think proper. But no more than the second fifteen members of the Institution shall be elected, until the last Wednesday in November next. On which day a general meeting of the Institution shall be held at the seat of government; and the members then present may proceed to elect fifteen additional members. Two months after which, another election of fifteen members may take place; but no more till the November then next. Thus they may proceed to hold two elections in each year, of fifteen members each, if they think proper, till the whole number allowed by law shall be elected. The Institution will fill its own vacancies, and those in the board of trustees, appoint its treasurer and secretaries; and, on all occasions after the first, elect the chancellor.

The chancellor and board of trustees shall have the sole management of the funds of the Institution, whether in lands or movables; they shall organise the Professorate, appoint the professors and other masters and teachers; assign them their compensations, and remove them at pleasure. They shall establish a central university, at or near the seat of government, and such other universities, colleges, and schools of education, as the funds of the Institution will enable them to do, whether in the city of Washington, or in other parts of the United States; and make the necessary regulations for the government and discipline of the same. They may likewise establish printing-presses for the use of the Institution, laboratories, libraries, and apparatus for the sciences and the arts, and gardens for botany and agricultural experiments.

Thus organised, and with proper endowments, the National Institution will be able to expand itself to a large breadth of public utility. It will, by its correspondence, its various establishments, its premiums, its gratuities, and other encouragements, excite a scrupulous attention to the duties of education in every part of the United States. By printing school books in the vast quantities that are wanted, and selling them at prime cost, it will furnish them at one third of the price usually demanded; and by an able selection or composition of such as are best adapted to the purpose, it will give a uniformity to the moral sentiment, a republican energy to the character, a liberal cast to the mind and manners, of the rising and following generations. None will deny that these things are peculiarly essential to the people of this country; for the preservation of their republican principles, and especially of their federal system.

Add to this the advantages that the government will draw, in its projected plans of public improvement, from this facility of concentrating the rays of science upon the most useful objects; from directing the researches of so many of the ablest men in the country, to the best modes of increasing its production and its happiness; from having a greater choice of young and well-taught engineers, civil and military; as well as mechanicians, architects, geologists; and men versed in the mathematical sciences and political economy.

Attached to the university in Washington, and under the direction of the Institution, might be the best position for the military academy, now at West Point, and likewise for the naval academy, and for the mint of the United States. The patent office is now an embarrassing appendage to the department of state. It might occupy very usefully one of the professors of this university. The machines and models belonging to it would be useful ornaments in a

lecture room, where mechanics, hydraulics, and other branches of natural philosophy are taught. Such professor might be the proper person to examine the applications for patents, and report upon their merits; the chancellor might grant the patent. It might likewise be advantageous, that the trustees, when the state of their funds will permit, should purchase from their proprietors such inventions as, in their opinion, might be of immediate and general use; and perhaps the chancellor might be authorized to refuse patents for impracticable things, and expose to public view such impostors as sometimes apply for them, with the intention of imposing upon the credulous, by selling their fallacious privileges either in whole or in part.

The geographical and mineralogical archives of the nation might be better placed in this university, than elsewhere. Being confided to professors, they might draw advantage from them in the course of their instructions. Thus the Institution might become a general depository of the results of scientific research; of experiments in arts, manufactures, and husbandry; and of discoveries by voyages and travels. In short, no rudiment of knowledge should be below its attention, no height of improvement above its ambition, no corner of an empire beyond its vigilant activity for collecting and diffusing information.

It is hoped that the Legislature, as well as our opulent citizens, will assist in making a liberal endowment for so great an object, and as soon as circumstances will admit; as too much time has already been lost, since the government has taken its definitive stand, in so advantageous a position, for the development of this part of our national resources.

APPENDIX D.

THE MORRILL ACT.

INTRODUCED IN THE HOUSE OF REPRESENTATIVES BY THE HON. JUSTIN S. MORRILL, OF VERMONT, AND APPROVED BY PRESIDENT LINCOLN,
JULY 2, 1862.

AN ACT donating Public Lands to the several States and Territories which may provide Colleges for the Benefit of Agriculture and Mechanic Arts.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there be granted to the several States, for the purposes hereinafter mentioned, an amount of public land, to be apportioned to each State a quantity equal to thirty thousand acres for each senator and representative in Congress to which the States are respectively entitled by the apportionment under the census of eighteen hundred and sixty: *Provided,* That no mineral lands shall be selected or purchased under the provisions of this act.

SEC. 2. *And be it further enacted,* That the land aforesaid, after being surveyed, shall be apportioned to the several States in sections or subdivisions of sections, not less than one quarter of a section; and whenever there are

public lands in a State subject to sale at private entry at one dollar and twenty-five cents per acre, the quantity to which said State shall be entitled shall be selected from such lands within the limits of such State, and the Secretary of the Interior is hereby directed to issue to each of the States in which there is not the quantity of public lands subject to sale at private entry at one dollar and twenty-five cents per acre, to which said State may be entitled under the provisions of this act, land scrip to the amount in acres for the deficiency of its distributive share : said scrip to be sold by said States and the proceeds thereof applied to the uses and purposes prescribed in this act, and for no other use or purpose whatsoever : *Provided, That in* no case shall any State to which land scrip may thus be issued be allowed to locate the same within the limits of any other State, or of any Territory of the United States, but their assignees may thus locate said land scrip upon any of the unappropriated lands of the United States subject to sale at private entry at one dollar and twenty-five cents, or less, per acre : *And provided further, That* not more than one million acres shall be located by such assignees in any one of the States : *And provided further, That* no such location shall be made before one year from the passage of this act.

SEC. 3. *And be it further enacted,* That all the expenses of management, superintendence, and taxes from date of selection of said lands, previous to their sales, and all expenses incurred in the management and disbursement of the moneys which may be received therefrom, shall be paid by the States to which they may belong, out of the treasury of said States, so that the entire proceeds of the sale of said lands shall be applied without any diminution whatever to the purposes hereinafter mentioned.

SEC. 4. *And be it further enacted,* That all moneys derived from the sale of the lands aforesaid by the State to which the lands are apportioned, and from the sales of land scrip hereinbefore provided for, shall be invested in stocks of the United States, or of the States, or some other safe stocks, yielding not less than five per centum upon the par value of said stocks ; and that the moneys so invested shall constitute a perpetual fund, the capital of which shall remain forever undiminished, (except so far as may be provided in section fifth of this act,) and the interest of which shall be inviolably appropriated, by each State which may take and claim the benefit of this act, to the endowment, support, and maintenance of at least one college where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life.

SEC. 5. *And be it further enacted,* That the grant of land and land scrip hereby authorized shall be made on the following conditions, to which, as well as to the provisions hereinbefore contained, the previous assent of the several States shall be signified by legislative acts :

First. If any portion of the fund invested, as provided by the foregoing section, or any portion of the interest thereon, shall, by any action or contingency be diminished or lost, it shall be replaced by the State to which it

belongs, so that the capital of the fund shall remain forever undiminished; and the annual interest shall be regularly applied without diminution to the purposes mentioned in the fourth section of this act, except that a sum, not exceeding ten per centum upon the amount received by any State under the provisions of this act, may be expended for the purchase of lands for sites or experimental farms, whenever authorized by the respective legislatures of said States.

Second. No portion of said fund, nor the interest thereon, shall be applied, directly or indirectly, under any pretence whatever, to the purchase, erection, preservation, or repair of any building or buildings.

Third. Any State which may take and claim the benefit of the provisions of this act shall provide, within five years, at least not less than one college, as described in the fourth section of this act, or the grant to such State shall cease; and said State shall be bound to pay the United States the amount received of any lands previously sold, and that the title to purchasers under the State shall be valid.

Fourth. An annual report shall be made regarding the progress of each college, recording any improvements and experiments made, with their costs and results, and such other matters, including State industrial and economical statistics, as may be supposed useful; one copy of which shall be transmitted by mail free, by each, to all the other colleges which may be endowed under the provisions of this act, and also one copy to the Secretary of the Interior.

Fifth. When lands shall be selected from those which have been raised to double the minimum price, in consequence of railroad grants, they shall be computed to the States at the maximum price, and the number of acres proportionally diminished.

Sixth. No State while in a condition of rebellion or insurrection against the government of the United States shall be entitled to the benefit of this act.

Seventh. No State shall be entitled to the benefits of this act unless it shall express its acceptance thereof by its legislature within two years from the date of its approval by the President.

SEC. 6. *And be it further enacted*, That land scrip issued under the provisions of this act shall not be subject to location until after the first day of January, one thousand eight hundred and sixty-three.

SEC. 7. *And be it further enacted*, That the land officers shall receive the same fees for locating land scrip issued under the provisions of this act as is now allowed for the location of military bounty land warrants under existing laws: *Provided*, their maximum compensation shall not be thereby increased.

SEC. 8. *And be it further enacted*, That the Governors of the several States to which scrip shall be issued under this act shall be required to report annually to Congress all sales made of such scrip until the whole shall be disposed of, the amount received for the same, and what appropriation has been made of the proceeds. Approved, July 2, 1862.

THE HATCH ACT.

INTRODUCED IN THE HOUSE OF REPRESENTATIVES IN 1885 BY THE
HON. WILLIAM H. HATCH, OF MISSOURI, AND APPROVED BY
PRESIDENT CLEVELAND, MARCH 2, 1887.

[Forty-ninth Congress, Second Session, Chapter 314, Statutes of the United States, vol. xxiv., page 440.]

AN ACT to establish agricultural experiment stations in connection with the colleges established in the several States under the provisions of an act approved July second, eighteen hundred and sixty-two, and of the acts supplementary thereto.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in order to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science, there shall be established, under direction of the college or colleges or agricultural department of colleges in each State or Territory established, or which may hereafter be established, in accordance with the provisions of an act approved July second, eighteen hundred and sixty-two, entitled "An act donating public lands to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanic arts," or any of the supplements to said act, a department to be known and designated as an "agricultural experiment station": *Provided,* That in any State or Territory in which two such colleges have been or may be so established the appropriation hereinafter made to such State or Territory shall be equally divided between such colleges, unless the legislature of such State or Territory shall otherwise direct.

SEC. 2. That it shall be the object and duty of said experiment stations to conduct original researches or verify experiments on the physiology of plants and animals; the diseases to which they are severally subject, with the remedies for the same; the chemical composition of useful plants at their different stages of growth; the comparative advantages of rotative cropping as pursued under a varying series of crops; the capacity of new plants or trees for acclimation; the analysis of oils and water; the chemical composition of manures, natural or artificial, with experiments designed to test their comparative effects on crops of different kinds; the adaptation and value of grasses and forage plants; the composition and digestibility of the different kinds of food for domestic animals; the scientific and economic questions involved in the production of butter and cheese; and such other researches or experiments bearing directly on the agricultural industry of the United States as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective States or Territories.

SEC. 3. That in order to secure, as far as practicable, uniformity of methods and results in the work of said stations, it shall be the duty of the United States

Commissioner of Agriculture to furnish forms, as far as practicable, for the tabulation of results of investigation or experiments; to indicate, from time to time, such lines of inquiry as to him shall seem most important; and, in general, to furnish such advice and assistance as will best promote the purposes of this act. It shall be the duty of each of said stations annually, on or before the first day of February, to make to the governor of the State or Territory in which it is located a full and detailed report of its operations, including a statement of receipts and expenditures, a copy of which report shall be sent to each of said stations, to the said Commissioner of Agriculture, and to the Secretary of the Treasury of the United States.

SEC. 4. That bulletins or reports of progress shall be published at said stations at least once in three months, one copy of which shall be sent to each newspaper in the States or Territories in which they are respectively located, and to such individuals actually engaged in farming as may request the same, and as far as the means of the station will permit. Such bulletins or reports and the annual reports of said stations shall be transmitted in the mails of the United States free of charge for postage, under such regulations as the Postmaster-General may from time to time prescribe.

SEC. 5. That for the purpose of paying the necessary expenses of conducting investigations and experiments and printing and distributing the results as hereinbefore described, the sum of fifteen thousand dollars per annum is hereby appropriated to each State, to be specially provided for by Congress in the appropriations from year to year, and to each Territory entitled under the provisions of section eight of this act, out of any money in the Treasury proceeding from the sales of public lands, to be paid in equal quarterly payments, on the first day of January, April, July, and October in each year, to the treasurer or other officer duly appointed by the governing boards of said colleges to receive the same, the first payment to be made on the first day of October, eighteen hundred and eighty-seven: *Provided, however,* That out of the first annual appropriation so received by any station an amount not exceeding one fifth may be expended in the erection, enlargement, or repair of a building or buildings necessary for carrying on the work of such station; and thereafter an amount not exceeding five per centum of such annual appropriation may be so expended,

SEC. 6. That whenever it shall appear to the Secretary of the Treasury from the annual statement of receipts and expenditures of any of said stations that a portion of the preceding annual appropriation remains unexpended, such amount shall be deducted from the next succeeding annual appropriation to such station, in order that the amount of money appropriated to any station shall not exceed the amount actually and necessarily required for its maintenance and support.

SEC. 7. That nothing in this act shall be construed to impair or modify the legal relation existing between any of the said colleges and the government of the States or Territories in which they are respectively located.

SEC. 8. That in States having colleges entitled under this section to the benefits of this act and having also agricultural experiment stations established by law separate from said colleges, such States shall be authorized to apply such benefits to experiments at stations so established by such States; and in case

any State shall have established under the provisions of said act of July second aforesaid, an agricultural department or experimental station, in connection with any university, college, or institution not distinctively an agricultural college or school, and such State shall have established or shall hereafter establish a separate agricultural college or school, which shall have connected therewith an experimental farm or station, the legislature of such State may apply in whole or in part the appropriation by this act made, to such separate agricultural college or school, and no legislature shall by contract express or implied disable itself from so doing.

SEC. 9. That the grants of moneys¹ authorized by this act are made subject to the legislative assent of the several States and Territories to the purposes of said grants: *Provided*, That payment of such instalments of the appropriation herein made as shall become due to any State before the adjournment of the regular session of its legislature meeting next after the passage of this act shall be made upon the assent of the governor thereof duly certified to the Secretary of the Treasury.

SEC. 10. Nothing in this act shall be held or construed as binding the United States to continue any payment from the Treasury to any or all the States or institutions mentioned in this act, but Congress may at any time amend, suspend, or repeal any or all the provisions of this act.

Approved, March 2, 1887.

APPENDIX E.

A LIST OF STATE UNIVERSITIES AND FEDERAL-LAND-GRANT COLLEGES, WITH THE DATES OF THEIR ORGANIZATION.

NOTE.—Most of the State Universities owe their origin wholly or in part to federal land grants in connection with the Morrill Act, or by special acts passed by Congress. The thirteen original States and six others have received no land grants, except for agricultural and mechanical colleges. All the territories have had land grants for educational purposes, except the District of Columbia and Alaska. Of the thirteen original States only four—Virginia, Georgia, and North and South Carolina—have founded and maintained State universities; six—Massachusetts, Connecticut, Pennsylvania, New Jersey, Rhode Island, and New Hampshire—founded in colonial days institutions which have become practically State universities; New York, though fairly liberal to its colleges, has never concentrated its patronage; Maryland and Delaware have practically ignored the university question. In the other States without grants—Vermont, Maine, Kentucky, Tennessee, Texas, and West Virginia—the efforts to found State institutions have been attended with much difficulty, and it is evident to one who studies the subject

¹ The grants of money to carry out the provisions of this act amounted in 1887-88 to \$585,000, in 1888-89 to \$595,000, in 1889-90 to \$600,000, and for 1890-91 the amount estimated is \$630,000.

that their educational systems are probably much less prosperous than they would have been had they received assistance from the general government similar to that given their sister States.¹

In the following list institutions wholly or in part supported by the State are designated by the symbol †. Institutions organized or extended in scope in connection with the Morrill Act of 1862 are designated by the symbol *. Institutions maintained in connection with the Hatch Act are designated by the symbol Δ. Institutions whose names are indented, are subordinated to those which precede them.

The total amount of land given by the general government, for State educational work, has been 1,995,920 acres. The total amount appropriated by the States for higher education is shown by Blackmar to have been \$27,475,646.

I am indebted to Prof. F. W. Blackmar, Prof. W. O. Atwater, and Mr. A. C. True for the facts embodied in the following tables :

ALABAMA.

(*Territory, 1817 ; State, 1819 ; Land Grant, 1818-19.*)

† UNIVERSITY OF ALABAMA, Tuscaloosa, 1819-21.

* ALABAMA AGRICULTURAL AND MECHANICAL COLLEGE, Auburn, 1872.

Δ AGRICULTURAL EXPERIMENT STATION, Auburn, 1883.

Δ† CANEBRAKE AGRICULTURAL EXPERIMENT STATION, Uniontown, 1885.

Alabama Historical Society, Tuscaloosa, 1851.

No scientific society in the State.

ALASKA.

(*Territory, 1872.*)

No colleges.

Alaska Historical Society, Sitka, 1890.

Society of Alaskan Natural History and Ethnology, Sitka, 1887.

ARIZONA.

(*Territory, 1863 ; Land Grant, 1881.*)

UNIVERSITY OF ARIZONA, Tucson, 1889.

COLLEGE OF AGRICULTURE, UNIV. OF ARIZONA, Tucson, 1889.

No historical or scientific society.

ARKANSAS.

(*Territory, 1819 ; State, 1836 ; Land Grant, 1836.*)

*† ARKANSAS INDUSTRIAL UNIVERSITY, Fayetteville, 1868-72.

Δ ARKANSAS AGRICULTURAL EXPERIMENT STATION, Fayetteville, 1888.
(Sub-stations at Pine Bluff, Newport, and Texarkana.)

Arkansas Historical Society, Little Rock.

No scientific society.

¹ See Blackmar's: "Federal and State Aid to Higher Education."

CALIFORNIA.

(*Territory*, 1846 ; *State*, 1850 ; *Land Grant*, 1853.)

†* UNIVERSITY OF CALIFORNIA, Berkeley, 1868-69.

COLLEGE OF AGRICULTURE, MECHANICS, MINING, ENGINEERING, AND CHEMISTRY, UNIV. OF CAL., Berkeley, 1866-68.

Δ AGRICULTURAL EXPERIMENT STATION, UNIV. OF CAL., Berkeley, 1876 and 1888.

(Outlying stations at Paso Robles, Tulare, Jackson, Cupertino, Fresno, Mission San José.)

California Historical Society, San Francisco.

California Academy of Sciences, San Francisco, 1854.

COLORADO.

(*Territory*, 1861 ; *State*, 1876 ; *Land Grant*, 1875.)

† UNIVERSITY OF COLORADO, Boulder, 1875-77.

* STATE AGRICULTURAL COLLEGE, Ft. Collins, 1879.

Δ AGRICULTURAL EXPERIMENT STATION OF COLORADO, Ft. Collins, 1888.
(Sub-stations at Del Norte and Rocky Ford.)

† STATE SCHOOL OF MINES, Golden, 1874.

Colorado State Historical Society, Denver.

Colorado Scientific Society, Denver.

CONNECTICUT.

(*Settled*, 1634 ; *State*, 1788.)

YALE UNIVERSITY, New Haven, 1700.

* SHEFFIELD SCIENTIFIC SCHOOL OF YALE UNIVERSITY, 1847 and 1864.

Δ† CONNECTICUT AGRICULTURAL EXPERIMENT STATION, New Haven, 1875 and 1877.

STORRS AGRICULTURAL SCHOOL, Mansfield, 1881.

STORRS SCHOOL AGRICULTURAL EXPERIMENT STATION, 1888.

Connecticut Academy of Sciences, New Haven, 1799.

Connecticut Historical Society, Hartford, 1825.

DAKOTA, NORTH.

(*Territory of Dakota*, 1861 ; *State*, 1889 ; *Land Grant*, 1881.)

(?) UNIVERSITY OF NORTH DAKOTA, Grand Forks, 1883-4.

NORTH DAKOTA AGRICULTURAL COLLEGE, Fargo, 1890.

No State historical or scientific society.

DAKOTA, SOUTH.

(*State*, 1889 ; *Land Grant*, 1881.)

(?) UNIVERSITY OF SOUTH DAKOTA, Vermillion, 1883.

† SOUTH DAKOTA AGRICULTURAL COLLEGE, Brookings, 1889.

SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION, Brookings, 1888.

SOUTH DAKOTA SCHOOL OF MINES, Rapid City, 1886.

No State historical or scientific society.

DELAWARE.

(*Settled*, 1638 ; *State*, 1787.)

†* DELAWARE COLLEGE, Newark, 1834, 1851, and 1871.

Δ DELAWARE COLLEGE AGRICULTURAL EXPERIMENT STATION, Newark, 1888.

Historical Society of Delaware, Wilmington, 1884.

No scientific society.

FLORIDA.

(*Territory*, 1821 ; *State*, 1845 ; *Land Grant*, 1845.)

* FLORIDA STATE AG'L. AND MECHANICAL COLLEGE, Lake City, 1884.

Δ AGRICULTURAL EXPERIMENT STATION OF FLORIDA, Lake City, 1888.

Historical Society of Florida, St. Augustine.

GEORGIA.

(*Settled*, 1732 ; *State*, 1788.)

†* UNIVERSITY OF GEORGIA, Athens, [1784], 1801.

GEORGIA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, OF THE UNIVERSITY OF GEORGIA, Athens, 1872.

Δ GEORGIA AGRICULTURAL EXPERIMENT STATION, Athens, 1888.

SOUTHWEST GEORGIA AGRICULTURAL COLLEGE, UNIV. OF GA., Cuthbert, 1879.

NORTH GEORGIA AGRICULTURAL COLLEGE, UNIV. OF GA., Dahlonega, 1873.

WEST GEORGIA AGRICULTURAL AND MECHANICAL COLLEGE, Hamilton, 1882.

MIDDLE GEORGIA MILITARY AND AGRICULTURAL COLLEGE, UNIV. OF GA., Milledgeville, 1880.

SOUTH GEORGIA COLLEGE OF AGRICULTURE AND THE MECHANIC ARTS, UNIVERSITY OF GEORGIA, Thomasville, 1879.

† ATLANTA UNIVERSITY (colored), Atlanta, 1869.

Georgia Historical Society, Savannah, 1839.

No scientific society.

ILLINOIS.

(*Territory*, 1809 ; *State*, 1818 ; *Land Grants*, 1804 and 1818.)

† UNIVERSITY OF ILLINOIS, Urbana, 1868. (Formerly Illinois Industrial University.)

* COLLEGE OF AGRICULTURE OF THE UNIVERSITY OF ILLINOIS, Urbana, 1867.

Δ AGRICULTURAL EXPERIMENT STATION OF THE UNIVERSITY OF ILLINOIS, Champaign, 1888.

Illinois State Historical Society, Champaign.

No State scientific society.

INDIANA.

(*Territory*, 1800 ; *State*, 1816 ; *Land Grants*, 1804 and 1816.)

† INDIANA UNIVERSITY, Bloomington, 1820-26. (Successor to Vincennes University, 1806.)

"PURDUE UNIVERSITY," Lafayette, 1874.

* SCHOOL OF AGRICULTURE, HORTICULTURE, AND VETERINARY SCIENCE
OF PURDUE UNIVERSITY, Lafayette, 1873.

△ AGRICULTURAL STATION OF INDIANA, Lafayette, 1887.

Indiana Historical Society, Indianapolis, 1832.

Indiana Academy of Sciences (unlocalized), 1885.

IOWA.

(*Territory*, 1838 ; *State*, 1846 ; *Land Grant*, 1845.)

† STATE UNIVERSITY OF IOWA, Iowa City, 1847-60.

* IOWA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, Ames,
1858 ; opened for students October 21, 1868.

△ IOWA AGRICULTURAL EXPERIMENT STATION, Ames, 1888.

Iowa State Historical Society, Iowa City.

Davenport Academy of Sciences, Davenport, 1867.

Iowa Academy of Sciences, Iowa City, 1875.

KANSAS.

(*Territory*, 1857 ; *State*, 1861 ; *Land Grant*, 1861.)

† UNIVERSITY OF KANSAS, Lawrence, 1861-66.

* KANSAS STATE AGRICULTURAL COLLEGE, Manhattan, 1863.

△ KANSAS AGRICULTURAL EXPERIMENT STATION, Manhattan, 1888.

Kansas State Historical Society, Topeka.

Kansas Academy of Science, Topeka, 1868.

KENTUCKY.

(*State*, 1792.)

* AGRICULTURAL AND MECHANICAL COLLEGE OF KENTUCKY, Lexington,
1865 ; reorganized 1880. (Successor to Transylvania University, organized 1798.)

△ KENTUCKY AGRICULTURAL EXPERIMENT STATION, Lexington, 1885.

Kentucky Historical Society, Frankfort.

No State scientific society.

LOUISIANA.

(*Territory*, 1803 ; *State*, 1812 ; *Land Grants*, 1806, 1811, 1827.)

TULANE UNIVERSITY OF LOUISIANA, New Orleans, 1847.

† SOUTHERN UNIVERSITY (colored), New Orleans, 1880.

†* LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL
COLLEGE, Baton Rouge, 1873 ; reorganized 1877.

△ † { SUGAR EXPERIMENT STATION No. 1, Kenner, 1885.
" " " " 2, Baton Rouge, 1886.
NORTH LOUISIANA EXPERIMENT STATION, Calhoun, 1888.

Louisiana Historical Society, Baton Rouge.

No State scientific society.

MAINE.

(*Settled*, 1622 ; *State*, 1820.)

- * MAINE STATE COLLEGE OF AGRICULTURE AND THE MECHANIC ARTS, Orono, 1865.¹
- △ MAINE STATE COLLEGE AGRICULTURAL EXPERIMENT STATION, Orono, 1885 and 1887.
- Maine Historical Society, Portland, 1822.
- No State scientific society.

MARYLAND.

(*Settled*, 1631 ; *State*, 1788.)

- [UNIVERSITY OF MARYLAND, organized 1784, abandoned 1805.]
- * MARYLAND AGRICULTURAL COLLEGE, Agricultural College, [1856], 1859.
- △ MARYLAND AGRICULTURAL EXPERIMENT STATION, Agricultural College, 1888.
- Maryland Academy of Sciences, 1822.
- Maryland Historical Society, Baltimore.

MASSACHUSETTS.

(*Settled*, 1620 ; *State*, 1788.)

- HARVARD UNIVERSITY, Cambridge, 1636.²
- * MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Boston, 1863-65.
- * MASSACHUSETTS AGRICULTURAL COLLEGE, Amherst, 1856, 1863, and 1867.
- † MASSACHUSETTS STATE AGRICULTURAL EXPERIMENT STATION, Amherst, 1882 and 1888.
- △ HATCH EXPERIMENT STATION OF MASSACHUSETTS AGRICULTURAL COLLEGE, Amherst, 1888.
- American Academy of Arts and Sciences, 1780.
- Massachusetts Historical Society, Boston.

MICHIGAN.

(*Territory*, 1805 ; *State*, 1836 ; *Land Grant*, 1836.)

- † UNIVERSITY OF MICHIGAN, Ann Arbor, [1817], 1836, 1840.
- * MICHIGAN AGRICULTURAL COLLEGE, Agricultural College, [1855], 1857.
- △ EXPERIMENT STATION OF MICHIGAN AGRICULTURAL COLLEGE, Agricultural College, 1888.
- Historical Society of Michigan, Detroit.
- No academy of sciences.

¹ State grants have been made to Bowdoin College, 1794-1802, and to Colby University formerly Waterville College, 1818.

² The appropriations by the State to Harvard have amounted to \$784,793, in addition to 46,000 acres of land. The State has also given \$157,500 to Williams, and \$52,500 to Amherst.

MINNESOTA.

(*Territory*, 1849 ; *State*, 1858 ; *Land Grants*, 1857, 1861, and 1870.)

†* UNIVERSITY OF MINNESOTA, Minneapolis, [1857], 1868.

COLLEGE OF AGRICULTURE AND MECHANIC ARTS OF THE UNIVERSITY OF MINNESOTA, Saint Anthony Park, 1868.

† STATE SCHOOL OF AGRICULTURE OF THE UNIVERSITY OF MINNESOTA, Saint Anthony Park, 1888.

Δ AGRICULTURAL EXPERIMENT STATION OF THE UNIVERSITY OF MINNESOTA, Saint Anthony Park, 1888.

Minnesota Historical Society, St. Paul.

Minnesota Academy of Science, Minneapolis, 1873.

St. Paul Academy of Sciences, St. Paul.

MISSISSIPPI.

(*Territory*, 1798 ; *State*, 1817 ; *Land Grants*, 1803, 1819.)

[JEFFERSON COLLEGE, Washington, 1803—discontinued.]

† UNIVERSITY OF MISSISSIPPI, Oxford, 1874.

* AGRICULTURAL AND MECHANICAL COLLEGE OF MISSISSIPPI, Agricultural College (Starkville), 1880.

Δ MISSISSIPPI AGRICULTURAL EXPERIMENT STATION, Agricultural College, 1888.

* ALCORN AGRICULTURAL AND MECHANICAL COLLEGE (colored), Rodney, 1871; reorganized in 1878.

Mississippi Historical Society, Jackson.

No academy of sciences.

MISSOURI.

(*Territory*, 1812 ; *State*, 1821 ; *Land Grants*, 1818 and 1820.)

†* UNIVERSITY OF MISSOURI, Columbia [1820], 1839.

MISSOURI AGRICULTURAL AND MECHANICAL COLLEGE OF THE UNIVERSITY OF MISSOURI, Columbia, 1870.

Δ MISSOURI AGRICULTURAL EXPERIMENT STATION, Columbia, 1881.

* MISSOURI SCHOOL OF MINES AND METALLURGY OF THE UNIV. OF MO., Rolla, 1870.

Missouri Historical Society, St. Louis.

St. Louis Academy of Sciences, 1857.

MONTANA.

(*Territory*, 1864 ; *Land Grant*, 1881.)

COLLEGE OF MONTANA, Deer Lodge, 1883.

Montana Historical Society, Helena.

NEBRASKA.

(*Territory*, 1859 ; *State*, 1867 ; *Land Grant*, 1864.)

†* UNIVERSITY OF NEBRASKA, Lincoln, 1869.

INDUSTRIAL COLLEGE OF THE UNIVERSITY OF NEBRASKA, Lincoln, 1869; opened for students 1871.

△ AGRICULTURAL EXPERIMENT STATION OF NEBRASKA, Lincoln, 1887.

Nebraska State Historical Society, Lincoln, 1878.

No scientific society.

NEVADA.

(*Territory*, 1861 ; *State*, 1864 ; *Land Grant*, 1866.)

†* STATE UNIVERSITY OF NEVADA, Reno [1865], 1874.

SCHOOL OF AGRICULTURE OF THE NEVADA STATE UNIVERSITY, Reno, 1887.

△ NEVADA STATE AGRICULTURAL STATION, Reno.

No scientific or historical society.

NEW HAMPSHIRE.

(*Settled*, 1629 ; *State*, 1788.)

DARTMOUTH COLLEGE, Hanover [1758], 1770.

* NEW HAMPSHIRE COLLEGE OF AGRICULTURE AND THE MECHANIC ARTS (in connection with Dartmouth College), Hanover, [1866], 1868.

△ NEW HAMPSHIRE AGRICULTURAL EXPERIMENT STATION, Hanover, 1888.

New Hampshire Historical Society, Concord, 1823.

No academy of science.

NEW JERSEY.

(*Settled*, 1614-20 ; *State*, 1787.)

COLLEGE OF NEW JERSEY, Princeton, 1746.

* RUTGERS SCIENTIFIC SCHOOL OF RUTGERS COLLEGE, New Brunswick.

Made State College of Agriculture and the Mechanic Arts [1864], 1865.

† NEW JERSEY STATE AGRICULTURAL EXPERIMENT STATION, New Brunswick, 1880.

△ NEW JERSEY AGRICULTURAL COLLEGE EXPERIMENT STATION, New Brunswick, 1888.

New Jersey Historical Society, Newark, 1845.

No academy of science.

NEW MEXICO.

(*Territory*, 1850 ; *Land Grant*, 1854.)

UNIVERSITY OF NEW MEXICO, Santa Fé, 1881.

† AGRICULTURAL COLLEGE OF NEW MEXICO, Las Cruces. Established by Territorial Legislature, 1888-89.

Historical Society of New Mexico, Santa Fé.

NEW YORK.

(*Settled*, 1613 ; *State*, 1788.)

THE UNIVERSITY OF NEW YORK, 1787, is not a teaching body. It is in indirect relationship with Columbia College, 1754, Union College, Hamilton College, and numerous collegiate and technical schools.

* CORNELL UNIVERSITY, Ithaca [1865], 1868.

COLLEGE OF AGRICULTURE OF CORNELL UNIVERSITY, Ithaca, 1888.

△ CORNELL UNIVERSITY AGRICULTURAL EXPERIMENT STATION, Ithaca, 1879.

† NEW YORK AGRICULTURAL EXPERIMENT STATION, Geneva, 1882.

New York Historical Society, New York, 1804.

New York Academy of Sciences, 1817.

NORTH CAROLINA.

(*Settled*, 1653 ; *State*, 1789.)

† UNIVERSITY OF NORTH CAROLINA, Chapel Hill [1789], 1795.

* NORTH CAROLINA COLLEGE OF AGRICULTURE AND MECHANIC ARTS, Raleigh. Established by State, 1889.

△† NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION, Raleigh, 1877 and 1887.

OHIO.

(*Territory*, 1788 ; *State*, 1803 ; *Land Grants*, 1792 and 1803.)

OHIO UNIVERSITY, Athens, 1804.

MIAMI UNIVERSITY, Oxford, 1809, 1816.

†* OHIO STATE UNIVERSITY, Columbus. Chartered 1870 ; organized, September 17, 1873.

△ OHIO AGRICULTURAL EXPERIMENT STATION, Columbus, 1882 and 1888.

Historical and Philosophical Society of Ohio, Cincinnati.

No State scientific society.

OREGON.

(*Territory*, 1848 ; *State*, 1859.)

† UNIVERSITY OF OREGON, Eugene City [1850], 1876.

* OREGON STATE AGRICULTURAL COLLEGE, Corvallis, 1888.

△ OREGON EXPERIMENT STATION, Corvallis, 1888.

Pioneer and Historical Society, Astoria.

No scientific society.

PENNSYLVANIA.

(*Settled*, 1626 ; *State*, 1787.)

UNIVERSITY OF PENNSYLVANIA, Philadelphia, 1751.

* PENNSYLVANIA STATE COLLEGE, State College, 1859, 1862, and 1874.

△† PENNSYLVANIA STATE COLLEGE AGRICULTURAL EXPERIMENT STATION, State College, 1887.

American Philosophical Society, Philadelphia, 1769.

Historical Society of Pennsylvania, Philadelphia, 1824.

RHODE ISLAND.

(*Settled*, 1636 ; *State*, 1790.)

- * BROWN UNIVERSITY, Providence, 1764.

AGRICULTURAL AND SCIENTIFIC DEPARTMENT OF BROWN UNIVERSITY,
Providence.

- † RHODE ISLAND STATE AGRICULTURAL SCHOOL, Kingston, 1888.

△ RHODE ISLAND STATE AGRICULTURAL COLLEGE EXPERIMENT STA-
TION, Kingston, 1888.

Rhode Island Historical Society, Providence.

SOUTH CAROLINA.

(*Settled*, 1670 ; *State*, 1788.)

- † * UNIVERSITY OF SOUTH CAROLINA, Columbia, 1801 ; reorganized 1865.

SOUTH CAROLINA COLLEGE OF AGRICULTURE AND MECHANIC ARTS,
UNIVERSITY OF SOUTH CAROLINA, Columbia, 1879.

△ SOUTH CAROLINA AGRICULTURAL EXPERIMENT STATION, Columbia,
1888.

- * CLAFLIN UNIVERSITY AND SOUTH CAROLINA AGRICULTURAL COLLEGE
AND MECHANICS' INSTITUTE, (Dept. of Univ. of S. C.) Orangeburg,
1872.

South Carolina Historical Society, Charleston.

TENNESSEE.

(*Territory*, 1790 ; *State*, 1796).

UNIVERSITY OF NASHVILLE (Cumberland College), 1806 ; discontinued 1875.

- † * UNIVERSITY OF TENNESSEE, Knoxville, 1806.

STATE AGRICULTURAL AND MECHANICAL COLLEGE OF THE UNIVERSITY
OF TENNESSEE, Knoxville, 1869.

△ TENNESSEE AGRICULTURAL EXPERIMENT STATION, Knoxville, 1882
and 1887.

Tennessee Historical Society, Nashville.

TEXAS.

(*Annexed*, 1846 ; *State*, 1845.)

- † UNIVERSITY OF TEXAS, Austin [1839], 1866.

- * STATE AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS, College
Station [1871], 1876.

△ TEXAS AGRICULTURAL EXPERIMENT STATION, College Station, 1888.

No historical or scientific society.

UTAH.

(*Territory*, 1850 ; *Land Grant*, 1855.)

UNIVERSITY OF DESERET, Salt Lake City, 1850.

- † UTAH AGRICULTURAL COLLEGE, Logan City. Established by Territorial
Legislature, March 8, 1888.

VERMONT.

(Settled, 1755-58 ; State, 1791.)

- * UNIVERSITY OF VERMONT [1791], 1800, and
STATE AGRICULTURAL COLLEGE, Burlington, 1865-67.
- Δ† VERMONT STATE AGRICULTURAL EXPERIMENT STATION, Burlington,
1887.

Vermont Historical Society, Montpelier.

VIRGINIA.

(Settled, 1609 ; State, 1788.)

- [COLLEGE OF HENRICO. Projected in 1620.]
- WILLIAM AND MARY COLLEGE, Williamsburg, 1691.
- † UNIVERSITY OF VIRGINIA, Charlottesville, 1819.
- * VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE, Blacksburg, 1872.
- Δ VIRGINIA AGRICULTURAL EXPERIMENT STATION, Blacksburg, 1888.
- * HAMPTON NORMAL AND AGRICULTURAL INSTITUTE, Hampton. Organ-
ized by American Missionary Society, April, 1868 ; reorganized under
charter from State, June, 1870.

Virginia Historical Society, Richmond, 1831.

WASHINGTON.

(Territory, 1853 ; State, 1889.)

UNIVERSITY OF WASHINGTON, Seattle, 1862.

WEST VIRGINIA.

(State, 1862.)

- †* WEST VIRGINIA UNIVERSITY, Morgantown, 1867.
- AGRICULTURAL DEPARTMENT OF WEST VIRGINIA UNIVERSITY, Mor-
gantown.
- Δ WEST VIRGINIA EXPERIMENT STATION, Morgantown, 1888.
- West Virginia Historical Society, Morgantown.

WISCONSIN.

(Territory, 1836 ; State, 1847 ; Land Grants, 1846 and 1854.)

- †* UNIVERSITY OF WISCONSIN, Madison [1838], 1848.
- DEPARTMENT OF AGRICULTURE OF THE UNIVERSITY OF WISCONSIN,
Madison, 1866.
- Δ† AGRICULTURAL EXPERIMENT STATION OF THE UNIVERSITY OF
WISCONSIN, Madison, 1883 and 1888.
- Wisconsin Historical Society, Madison.
- Wisconsin Academy of Science, Arts, and Letters, Madison, 1870.

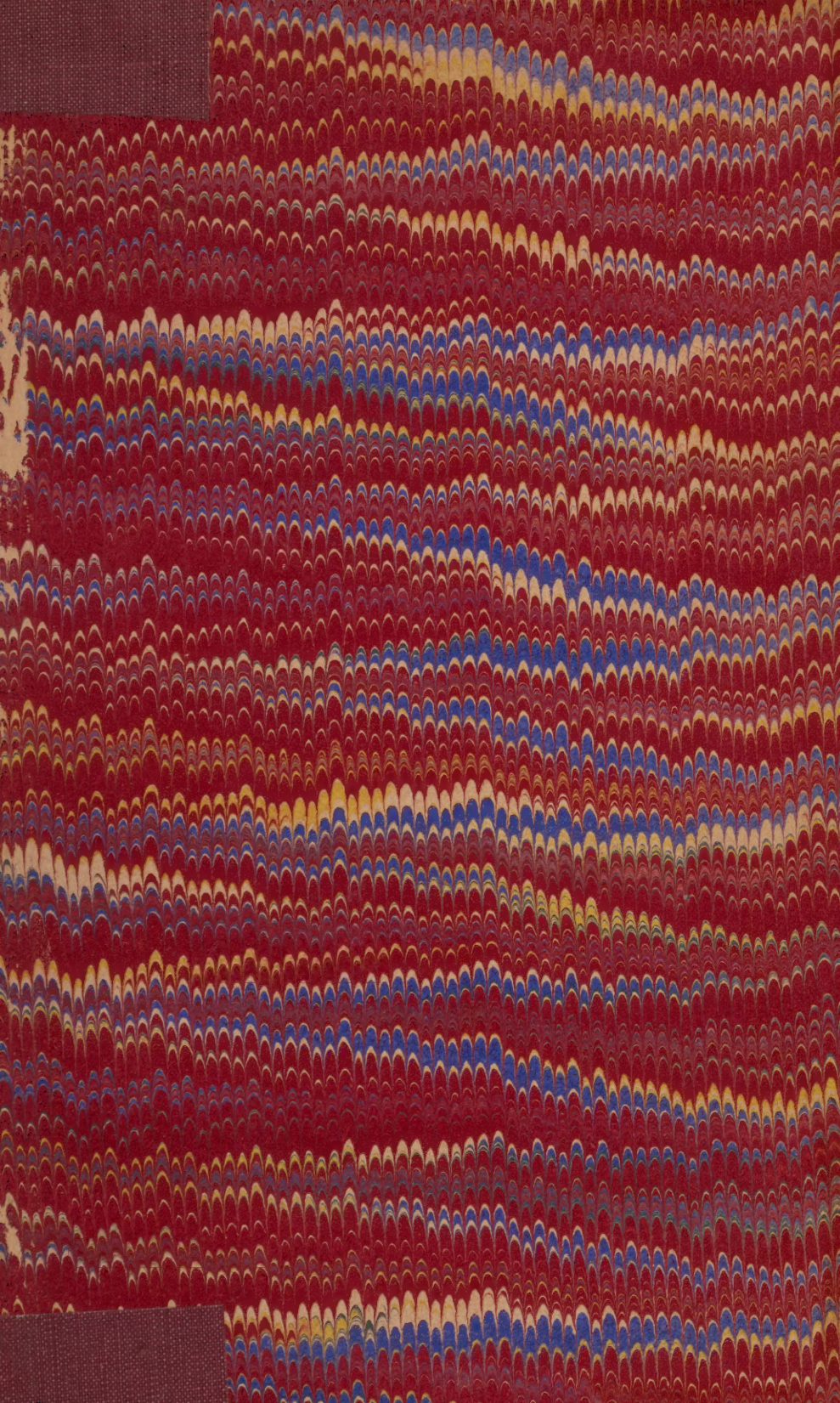
WYOMING.

(Territory, 1868 ; State, 1889.)

UNIVERSITY OF WYOMING, Laramie City.

Wyoming Academy of Arts, Science, and Letters, Cheyenne.





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